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United States
Department of
Agriculture

Forest Service

**Pacific
Northwest
Region**

1986

Draft Environmental Impact Statement

Proposed Land and Resource Management Plan

Okanogan National Forest

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This document presents the results of the environmental analysis of alternative ways of managing the Okanogan National Forest for the next 10 to 15 years. Long-term estimates of Forest resources and environmental conditions are analyzed for every alternative, but any alternative adopted as the Forest Plan would apply for no more than 15 years.

This Proposed Forest Plan presents direction for managing the Okanogan National Forest for the next 10 to 15 years. The Forest Plan will be revised at least every 15 years, and sooner if the Forest Supervisor determines that environmental conditions or resource demands have changed significantly, or if significant changes are needed to respond to changes in National policies, goals, or objectives.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

OKANOGAN NATIONAL FOREST
LAND AND RESOURCE MANAGEMENT PLAN

Okanogan, Skagit, Whatcom and Chelan Counties; Washington State

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ABSTRACT

Ten alternatives for development of a Land and Resource Management Plan for the 1,706,000 acres administered by the Okanogan National Forest are described and evaluated. The alternatives are (A) Current Direction (No-Action), which continues the management of the forest according to current plans and policies; (B) RPA, which responds to the 1980 Resources Planning Act (RPA) Program; (C) which emphasizes non-market (or amenity) resources; (D) which emphasizes market opportunities; (E) which retains all roadless areas, and emphasizes timber management on the remainder of the forest; (F) which emphasizes mule deer in the Methow Valley and timber management on the remainder of the forest; (G) which offers a combination of amenity and commodity benefits; (G- departure) which offers a combination of amenity and commodity benefits, while providing a higher level of harvest during the first decade than Alternative G; (H) which emphasizes wildlife and timber management; (I) which emphasizes the retention of roadless areas for future consideration as wilderness, while managing the rest of the forest for wildlife and scenic values. Alternative G-departure is the Forest Service preferred alternative. The plan will guide management for the decade 1986-1995.

Date by which comments must be received: July 15, 1986.

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HOW THESE DOCUMENTS ARE ORGANIZED

Included in this package are four books and a packet of maps. These books are the Draft Environmental Impact Statement (DEIS) for the Okanogan National Forest, the Appendices to the DEIS, the Proposed Forest Plan for the Okanogan National Forest and the Reviewer's Guide. The map packet includes nine alternative maps and seven resource inventory maps.

A general outline of the documents and a brief summary of the chapters follows:

The DEIS:

This document is more easily understood if the chapters are read in the following order: III, I, II and IV. Chapters V through VIII contain additional information about who prepared the documents, who the documents were sent to, references, terms you should know (glossary) and an index.

Chapters I, II, III and IV contain the body of the EIS.

Chapter I, "Purpose and Need," identifies the laws and regulations used to direct the planning and environmental analysis process. It also identifies the public issues and management concerns about the land and resource management of the Okanogan National Forest.

Chapter II, "Alternatives, Including the Proposed Action," explains the process used to formulate alternatives, describes the alternatives, and compares the alternatives in terms of the issues and concerns and the outputs and effects. The accompanying map packet contains maps displaying management areas for each of the alternatives.

Chapter III, "Affected Environment," presents the physical, biological, economic and social setting of the Okanogan National Forest. The accompanying map packet contains inventory maps for several of the resources described in Chapter III.

Chapter IV, "Environmental Consequences," discusses the environmental consequences of the alternatives, including unavoidable adverse impact, irreversible or irretrievable effects, and short-term uses versus long-term productivity. This chapter also contains a section displaying how well the preferred alternative meshes wish the plans and policies of other agencies.

Chapter V, "List of Preparers," documents the background and roles of each Interdisciplinary Team (IDT) member.

Chapter VI, "List of Agencies, Organizations, and Persons to Whom Copies of the Statement Were Sent," documents who received copies of this DEIS.

Chapter VII, "References," documents references used in this DEIS.

Chapter VIII. "Glossary," defines acronyms, terms and phrases used in this DEIS.

Chapter IX. "Index," contains a list of subjects with corresponding page numbers on where information on those subjects can be found in this DEIS.

Resources discussion in each of the chapters in the DEIS are presented in the order given in the USDA - Forest Service, National Environmental Policy Act (NEPA) Procedures Handbook. The order used is not intended to imply that the first resources are any more important that the last resources. The NEPA Procedures Handbook displays a "laundry list" of resources to help the writers of Environmental Impact Statements make sure they have covered all resources.

The Appendices

The appendices contain technical discussions about various aspects of the planning process. They contain more detailed descriptions of some environments, analyses, and effects.

The Proposed Forest Plan

The Proposed Okanogan National Forest Land and Resource Management Plan contains information about how the forest land and resources will be managed if the preferred alternative is implemented. Here are found the detailed standards and guidelines for management practices.

It is important to remember that the Proposed Forest Plan is a proposal, and that the Draft Environmental Impact Statement is a draft. The information gained in the public review process can result in a modified or new Environmental Impact Statement, and in a modified or substantially new Forest Plan.

The Reviewer's Guide

The Reviewer's Guide contains the summary of the DEIS and a response form for you to give input to the documents.

In addition to the material included in the DEIS, Proposed Forest Plan, Reviewer's Guide and supporting Appendices, other process records are on file at the Supervisor's Office, Okanogan National Forest, 1240 South Second Avenue, Okanogan, Washington, 98840. These include records documenting the timber land suitability determination; the analytic processes for recreation, wildlife, range, diversity; and yield table development, and others. This information is available for review on request. Regional direction for topics such as minimum management requirements is available at the USDA Forest Service, Pacific Northwest Region, 319 S.W. Pine Street, P.O. Box 3623, Portland, Oregon, 97208.

THIS DRAFT ENVIRONMENTAL IMPACT STATEMENT IS SUBJECT TO SOME POTENTIAL ADJUSTMENT PENDING THE DECISIONS ON THE SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE REGIONAL GUIDE FOR THE PACIFIC NORTHWEST REGION. THE REGIONAL GUIDE SUPPLEMENT IS BEING PREPARED TO ADDRESS SPOTTED OWLS ON A REGIONAL BASIS. THIS COULD REQUIRE CHANGES IN THE WAY THE SPOTTED OWL HAS BEEN ADDRESSED ON THE OKANOGAN NATIONAL FOREST IN THIS DEIS WHICH COULD RESULT IN MINOR ADJUSTMENTS IN OUTPUTS AND EFFECTS.

Chapter I

PURPOSE AND NEED

INTRODUCTION

This Draft Environmental Impact Statement (DEIS) discloses ten alternatives, including an alternative identified as the preferred alternative (which is the "proposed action"). These are alternate ways of managing the land and resources of the Okanogan National Forest. The alternatives provide for multiple use and sustained yield of goods and services from the National Forest. This DEIS also describes the environment that would be affected, and the environmental consequences of implementing each of the alternatives.

Each alternative furnishes a different way to address local, regional and national public issues and Forest Service management concerns, while providing for use and protection of resources and fulfilling legislative requirements. Every alternative generates a different mix of goods and services from the Okanogan National Forest.

Each alternative was evaluated to determine its potential to provide a sustained yield of goods and services in a way that maximizes long-term public benefits in an environmentally sound manner.

The preferred alternative is the alternative which, in the considered opinion of the Forest Service, provides for a level of multiple uses, goods and services that maximizes long-term net public benefits in an environmentally sound manner. The Forest Services proposes Alternative G-departure as the alternative that best accomplishes these objectives.

The preferred alternative is the basis for the accompanying "Proposed Okanogan National Forest Land and Resource Management Plan" (Proposed Forest Plan) document. The purpose of the Forest Plan is to direct and guide all natural resource management activities on the Okanogan National Forest. Preparation of the Proposed Forest Plan is required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), as amended by the National Forest Management Act of 1976 (NFMA), plus the associated National Forest System Land and Resource Planning Regulations (36 CFR 219).1/

1/ 36 CFR 219 refers to Part 219 of Title 36 of the Code of Federal Regulations.

Preparation of an Environmental Impact Statement (EIS), disclosing a preferred alternative and alternatives to the preferred alternative, is required by the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality NEPA Regulations (40 CFR 1500), in order to implement the forest planning provisions of NFMA (36 CFR 219). For purposes of disclosure under NEPA, this DEIS and the accompanying Proposed Forest Plan are treated as combined documents.

This Environmental Impact Statement is required because the Forest Plan is a major Federal action that will have a significant effect on the quality of the human environment. Its purpose is to provide decision-makers with an environmental disclosure sufficiently detailed to aid in the selection of management direction for the Okanogan National Forest. Equally important, its purpose is to make information of the alternatives' environmental impacts available to the public, and to encourage public participation in the development and refinement of that information.

PLANNING PROCESS

A general understanding of the overall Forest Service planning process is important to put this Forest Planning process in perspective. As required by the RPA, NFMA and the related implementing regulations cited above, the Forest Service has a three-level, integrated planning process. At the national level, the RPA Program establishes long-range National resource objectives based on the present and anticipated supply of, and demand for, various resources. A portion of each national resource objective included in the RPA Program is distributed to each of the nine Forest Service Regions in the Nation.

At the Regional level, a Regional Guide is developed. The Regional Guide presents the distribution of a Region's portion of the National objective to each National Forest. In addition, the Regional Guide establishes Regional management standards and guidelines. "The Regional Guide for the Pacific Northwest Region" of May 1984 provides this direction for the Okanogan National Forest.

At the National Forest level, a proposed Forest Plan is prepared. A range of resource objectives are considered in the form of alternatives; one of these alternatives is designed to meet the current RPA Program resource objectives displayed in the Regional Guide. The study of the outputs and effects of the alternatives provide valuable information to the Regional and National programs regarding forest capabilities and programs.

The planning process continuously cycles: Information from the forest level flows up to the national level, is incorporated in the RPA Program, and then flows back to the National Forest level. The information regarding resource capacities and demands provided by the National Forests is incorporated in the RPA environmental analysis and program. The RPA program is then submitted to Congress as an aid to determine appropriation and authorization of the Forest Service's annual budget. Because allocations in the annual budget have a major effect on forest management activities, many of the National Forests' actual outputs and environmental effects are ultimately determined in large part by the annual budget. But through the overall planning process, the annual budget can be responsive to needs and capacities on the National Forests.

The RPA Program is updated every five years. The Forest Plan will be reviewed every 5 years, and be revised on a 10-year cycle, or when changes in the RPA program significantly affect forest programs. The Plan must be revised at least every 15 years. It also may be revised whenever conditions or demands in the area covered by a Plan significantly change. This process ensures that the Plan is responsive to changing conditions.

The planning process specified in the NFMA implementing regulations, and the environmental analysis process specified in the Council on Environmental Quality (CEQ) regulations were used in developing this DEIS and the accompanying Proposed Forest Plan. The planning steps employed are:

1. Identification of purpose and need;
2. Preparation of planning criteria;
3. Inventory of data and information collection;
4. Analysis of the management situation;
5. Formulation of alternatives;
6. Estimation of effects of alternatives;
7. Evaluation of alternatives;
8. Recommendation of a preferred alternative;
9. Implementation of the Plan; and
10. Monitoring of implementation and evaluation.

A team of specialists was chosen by the Okanogan National Forest Supervisor to develop this DEIS and Forest Plan. Team members represent a broad range of disciplines. This group of people, referred to as the interdisciplinary team, or IDT, used a consensus approach for problem solving and planning process decisions.

The results of the environmental analysis are documented in this DEIS. Publication of this document makes environmental information available to public officials and citizens before Forest Service decisions are made and actions are taken.

This DEIS and the Proposed Forest Plan are being circulated for review and comment. Some planning steps may be repeated if necessary to respond to public comment. The resulting Final Environmental Impact Statement (FEIS) will be used by the Regional Forester to make a decision regarding approval of the Forest Plan. This decision will be documented in a Record of Decision which will be available to the public.

Upon implementation, the FEIS will be used for "tiering" in accordance with the CEQ regulations. Tiering means that environmental analysis done for projects which implement the Forest Plan will refer to the FEIS and associated documents rather than repeat information. The environmental documents for specific projects will concentrate on issues unique to the projects.

The Okanogan National Forest EIS is tiered to the 1984 Region Six FEIS for the Regional Guide and to the 1981 "Methods of Managing Competing Vegetation" FEIS. The Regional Guide is explained above. The decision made in the 1981 FEIS is to use a variety of vegetative management techniques, which includes the use of herbicides, mechanical, biological and other appropriate techniques. It also directs the forests to make site by site environmental analyses.

The Forest Plan supercedes most previous land management and resource management plans prepared for the Okanogan National Forest. The following is a list of land management and resource management plans superceded by this Land and Resource Management Plan:

1. The 1969 Okanogan National Forest Timber Management Plan
2. The 1969 Winthrop Ranger District Multiple-Use Plan
3. The 1969 Conconully Ranger District Multiple-Use Plan
4. The 1969 Twisp Ranger District Multiple-Use Plan
5. The 1969 Okanogan National Forest Land Ownership Adjustment Plan
6. The 1970 Golden Horn Multiple-Use Survey Report
7. The 1970 Harts Pass Multiple-Use Survey Report
8. The 1970 Liberty Bell Multiple-Use Survey Report
9. The 1970 Sawtooth Multiple-Use Survey Report
10. The 1975 Biological Unit Plan for the Methow Deer Herds
11. The 1978 Visual Resource Management Plan
12. The 1978 Okanogan National Forest Off-Road Vehicle Plan
13. The 1979 Tonasket Planning Unit Land Management Plan
14. The 1979 Pasayten Wilderness Management Plan
15. The 1980 Five-year Interim Road Management Plan
16. The 1984 Appropriate Suppression Response Implementation Plan
17. The 1985 Okanogan National Forest Travel Plan

The 1984 Early Winters Alpine Winter Sports Study FEIS is incorporated by reference to this plan. The decision made in the 1984 Early Winters FEIS is to develop a Winter Sports Site on approximately 3900 acres of land, called Sandy Butte. The permitted facilities could serve 8200 skiers at one time.

The range allotment plans are site specific prescriptions and practices for the management of grazing lands for livestock. Allotment management plans that are not consistent with the Forest Plan will be revised as soon as possible, following the schedule set by the Regional Forester.

Upon implementation, Okanogan National Forest management activities will comply with the Forest Plan. Appropriated budgets may alter the schedule of activities. In addition, all permits, contracts and other instruments for the use and occupancy of National Forest System lands and resource uses must be consistent with the Forest Plan as soon as possible [36 CFR 219.10(e)]. See Chapter 5 of the Forest Plan for information on when permits, contracts and other instruments must be in compliance with the Forest Plan.

FOREST OVERVIEW

The Okanogan National Forest is one of the most scenic areas in Washington State. The rugged North Cascades mountain range forms the western boundary of the forest; jagged, glacier carved peaks provide a backdrop for sweeping vistas and panoramic views. The Okanogan Forest (including those portions of the Mt. Baker-Snoqualmie National Forest and Wenatchee National Forest administered by the Okanogan National Forest) is located in North Central Washington, occupying 1,706,000 acres in portions of Okanogan, Skagit, Whatcom and Chelan counties, with Okanogan County covering most of the forest (see Figure I-1, next page).

Glaciation has played an important role in shaping the topography of the Okanogan National Forest. Terrain ranges from the steep and rugged ridges and valleys of the North Cascades which were sculpted by alpine glaciation, to the moderate and gentle topography of the Okanogan Highlands caused by continental glaciation.

Two major river systems drain the forest; the Okanogan River and its tributaries are located on the eastern portion of the forest, and the Methow River and its tributaries drain the middle portion, on the east side of the Cascade Crest. Lands west of the Cascade Crest are drained by tributaries of the Skagit River.

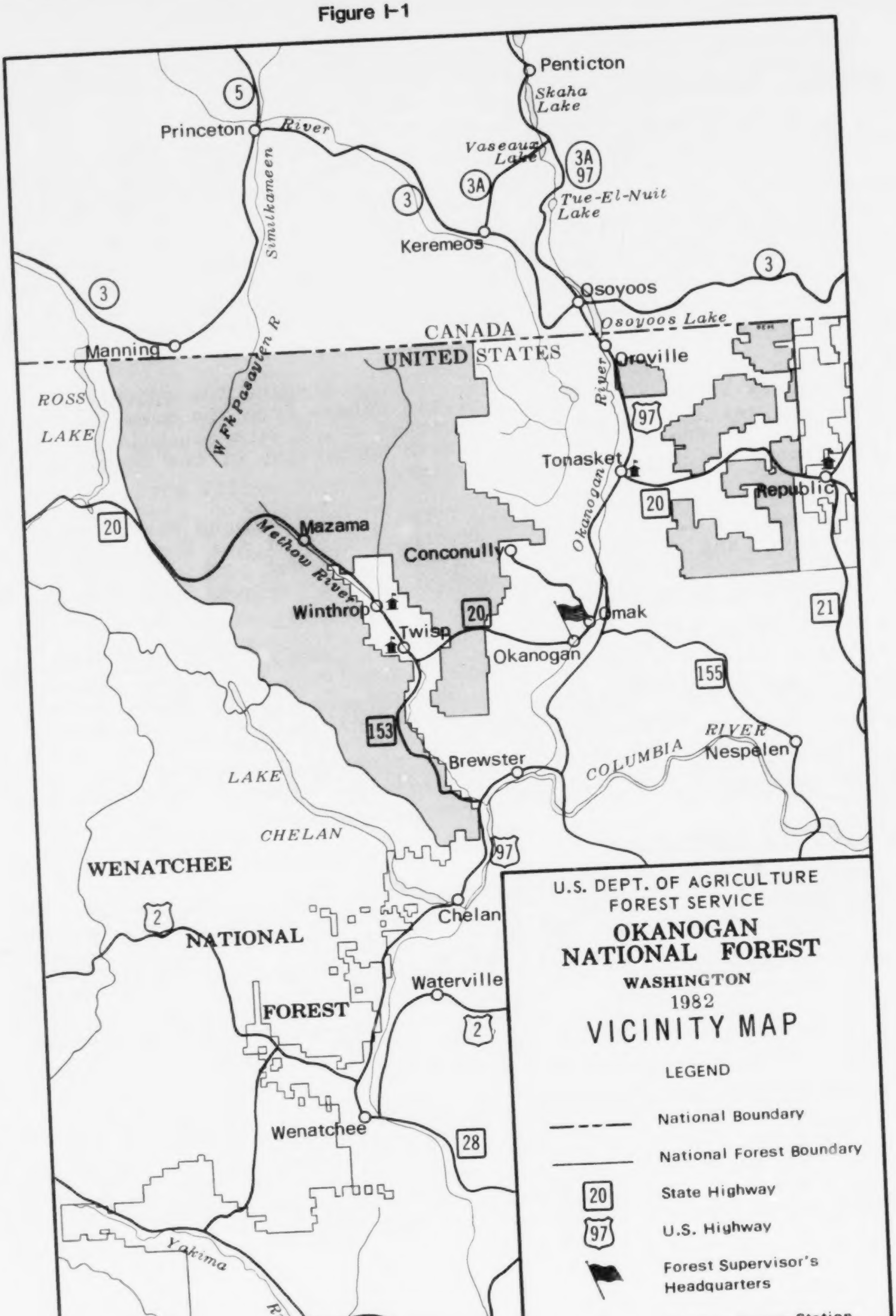
The majority of the population of Okanogan County lives in the Okanogan and Methow river valleys. The major towns found in and near these valleys are Omak, Okanogan, Brewster, Pateros, Twisp, Winthrop, Tonasket and Oroville. The highest population densities occur in and around the towns of Omak and Okanogan. Farming, ranching, timber and recreation are the most important elements in the economy of the area. The principal forest resources are timber, wildlife, forage and recreation (for further information, see Chapter III).

ISSUES AND CONCERNS

The Okanogan National Forest consists of complex natural systems that can be managed for different mixes of resource outputs, land uses and environmental conditions. Different people and groups prefer to see the forest managed to emphasize different outputs, uses and conditions. Because all the resources, uses and conditions of a forest are interconnected, managing to emphasize some resources results in changes in others. Trade-offs are necessary when something one person wants results in changes to what others want. There are practical and natural limits to what a forest can provide.

A central task in Forest Planning is analyzing the alternative ways of managing the National Forest to determine the implications for the environment and for human uses of the forest. The different emphases in goods, services, uses and environmental conditions that people want and don't want are used to identify the alternative mixtures of management practices that are formulated and analyzed.

Figure I-1


Penticton
Skaha Lake
5
Princeton
River
Similkameen
Vaseaux Lake
3A
97
3A
3
Tue-El-Nuit Lake
Keremeos
3
3
Osoyoos
Osoyoos Lake
CANADA
Manning
W Fk Pasayten R
UNITED STATES
Oroville
ROSS
LAKE
River
97
Okanogan
Tonasket
Republic
20
20
Mazama
Methow River
Conconully
Winthrop
20
Omak
21
Twisp
Okanogan
155
153
RIVER
Brewster
COLUMBIA
Nespelen
LAKE
CHELAN
97
WENATCHEE
2
NATIONAL
Chelan
FOREST
Waterville
2
Wenatchee
28
Yakima
River
97
U.S. DEPT. OF AGRICULTURE
FOREST SERVICE
OKANOGAN
NATIONAL FOREST
WASHINGTON
1982
VICINITY MAP
LEGEND
National Boundary
National Forest Boundary
20 State Highway
97 U.S. Highway
Forest Supervisor's Headquarters
District Ranger Station

These different preferences of individuals and groups, and the physical, biological and legal limits of forest management are presented in the issues and concerns which guide the forest planning process. A public issue is a subject or question of widespread public interest relating to management of the National Forest System. A management concern is an issue, problem or a condition which constrains the range of management practices identified by the Forest Service in the planning process.

Another component influencing alternatives comes from the various resource use and development opportunities suggested by both the public and the Forest Service. These resource use and development opportunities are the base of the many issues and concerns identified here. The opportunity to preserve or develop and use the resources of the National Forest is the focus of many of the agency's programs, and the principal focus of the management alternatives developed here.

Because both public issues and management concerns stem from these opportunities, most of them are incorporated within the discussion of issues and concerns. Other resource use and development opportunities, along with the issues and concerns, are presented in detail in Appendix A.

A necessary step in the planning process is identification of major public issues and management concerns. This was accomplished through an extensive process involving individual members of the public, private landowners adjacent to the Okanogan National Forest, other agencies, the Colville Confederated Tribes, and groups of individuals with similar interests. Some of these same individuals and groups have also reviewed and contributed to the planning effort at other stages, including development of alternatives.

Careful review of the issues and concerns reveals common threads to topics people raised: (1) vegetation management, and (2) access.

Management decisions made through this Forest Plan will greatly influence these two threads. Therefore most of the issues and concerns that drove the alternative formulation process fall into these two categories.

Alternatives were formulated to meet goals developed from the driver issues and concerns. These driver issues and concerns are: scenery, the North Cascades Scenic Highway, timber harvest level, timber species mix, riparian areas, protection (insect and disease control in lodgepole pine stands), roadless areas, big game, small game/non-game, economics, and Research Natural Areas. Varying mixes of the other issues and concerns result from the alternatives; these are reported as outputs and effects in Chapter IV.

The list of issues and concerns identified below is the result of public comment gained over several years. The background section under each issue explains why the subject matter is an issue or concern. The second section states what people said during public involvement. Additional information on how the issues and concerns were collected, evaluated and selected for inclusion in the planning analysis is presented in Appendix A. The resource opportunities are identified in Chapter III, Affected Environment.

ISSUES AND CONCERNS THAT DROVE ALTERNATIVE FORMULATION ARE PRECEDED BY AN ASTERISK (*).

SOIL, WATER AND AIR

HOW WILL ECOSYSTEMS AND ENVIRONMENTAL QUALITY BE PROTECTED?

Background - Road building and logging influence the soil resource and water quality. Certain soil types can be susceptible to erosion or mass failure, and others can be compacted through tractor logging. Yarding of logs can also affect the amount of suspended sediment in a stream.

Local loss of visibility by burning wood wastes from logging operations is the principal reason for reductions in air quality. Smoke management requirements attempt to restrict burning to when weather conditions are favorable for dispersal of smoke into the upper atmosphere and away from population centers or other smoke-sensitive areas.

What People Said - The public emphasizes the protection of the environment in general, including air quality, water quality and the soil resource.

*HOW WILL RIPARIAN AREAS BE PROTECTED?

Background - Riparian areas (wetlands, lakes and streams and their immediate areas of influence) are important habitat for wildlife. Disturbance of these areas through logging or grazing can degrade both water quality and wildlife habitat. Livestock tend to congregate around riparian areas because they are the "ice cream" spots.

Creating buffers or no-cut areas around and along riparian areas can cause problems for current and future logging plans in adjacent areas. Requirements to protect streams can increase logging costs.

These areas are also important from the recreation standpoint because most existing recreation developments are located here.

What People Said - Most comments stress protection of these areas from logging and grazing, with emphasis on maintenance of water quality and the riparian ecosystem. Some members of the public are particularly concerned about protection of riparian areas for wildlife, because wildlife tend to concentrate in these areas. In contrast, some people commented that current restrictions on logging in riparian areas are too rigid, and that these areas should be more intensively managed.

MINERAL DEVELOPMENT

WHAT MINERAL RESOURCE ACTIVITIES WILL BE ENCOURAGED?

Background - Developing access is the most important way the forest can provide opportunities for mineral exploration. The greater the amount of roaded area, the easier the exploration process.

Much of the concern over minerals is about minerals development, which is not an issue that will be resolved by this plan. Individual proposals will require a separate environmental analysis.

What People Said - Most comments centered around concern over large areas of surface disturbance, such as open pit mines, although comments ranged from the desire to extract all minerals to the desire to prohibit mining altogether.

Miners express the desire that easy access be provided for mining activities.

FIRE

HOW WILL FIRE BE MANAGED?

Background - Past Forest Service fire management policy directed that forest fires be attacked with sufficient forces to gain control of all fires as quickly as possible. Each wildfire was suppressed regardless of vegetative type, burning conditions, fuels or land management objectives. To ensure that resources were available to implement this policy, costly expenditures were required on each National Forest for manpower, equipment and aircraft support. This resulted in situations where costs of fire suppression often times exceeded overall resource losses. This imbalance in the costs to benefits for fire protection, coupled with new knowledge gained about the role of wildfire and prescribed fire within forest and range ecosystems, prompted the Forest Service to revise its overall fire management objective in 1978.

Current fire management policy directs each National Forest to develop and implement fire protection and fire use programs that are cost effective and responsive to land and resource management goals and objectives. The protection of the public, capital investments located on the forest and private land within and adjacent to the forest carries the highest priority when using suppression resources.

Wilderness and unroaded recreation areas have the lowest priority for fire protection because of the role of wildfire in shaping the natural ecosystem within these areas. The suppression response to each wildfire in wilderness and unroaded recreation areas is dealt with on a case-by-case basis. Confinement of fires is a common practice.

What People Said - Some people reject the policy of allowing forest fires to burn out naturally in certain areas, particularly in the wilderness; some people support the policy.

ROADS AND ACCESS

HOW WILL THE OKANOGAN NATIONAL FOREST ROADS BE MANAGED AND ACCESS TO THE FOREST BE PROVIDED?

Background -In the past, the Forest Service has built roads to standards that accept or encourage highway vehicles. Because most roads now constructed on this forest are used primarily as access for timber management, roads could be constructed to a level that accepts only high clearance vehicles. This reduces timber management costs, and if roads are "put to bed" or barricaded following timber management activities, future savings in road operations and maintenance costs could be realized.

However, these actions limit the amount of roaded access provided to the general public. Higher road standards from the past have accustomed people to being able to drive wherever they want. Limiting access now and in the future means that new roads will not be available for motorized access for woodcutting and other recreational activities. Not limiting motorized access in the future will mean that operational costs and wildlife habitat degradation will increase.

What People Said - The public's emphases are on road construction, maintenance, and the location and amount of roads. Many people feel that roads are currently being built to standards that are too high for the intended use. Other comments centered around new road construction; some people want more access provided; others want no new roads built.

The public is also concerned about access to the Okanogan National Forest, with some people expressing a need for restricting access and some objecting to restricted access. The majority of comments objecting to road restrictions were in reference to loss of firewood cutting opportunities, while those advocating road closures wanted better wildlife protection or better quality hunting and fishing experiences.

WILDERNESS

HOW WILL WILDERNESS AREAS BE MANAGED?

Background - The Wilderness Act of 1964 is very restrictive in what activities can and cannot occur within designated wilderness. However, decisions can still be made regarding such topics as fire management, recreation use, grazing levels, administrative cabins and dams (which require the President's approval).

Conflicts arise because some people feel the wilderness experience should not include livestock grazing. Although the Wilderness Act allows for continuance of livestock grazing in areas that were grazed at the time an area was designated wilderness, grazing levels are to be determined by forest managers.

Fire has played a major role in the shaping of many of the ecosystems found within wilderness. The cost of fire suppression and damages from suppression actions on the wilderness character, have prompted use of a confinement fire suppression strategy within the Pasayten and Lake Chelan-Sawtooth Wildernesses. Under this strategy, fire managers allow certain wildfires to burn out naturally within natural breaks and barriers. Fires that threaten capital investments, significant cultural resources or threaten to leave the wilderness are contained or controlled.

Levels of recreation use have increased in recent years, particularily along major trail routes, and are expected to continue to increase. The question arises: How much use is acceptable before access to the wilderness is limited?

Although the Wilderness Act allows the construction of dams, such construction requires the approval of the President of the United States. Many people feel that this is no guarantee that dams will not be constructed and are therefore seeking Wild and Scenic designation for the Pasayten River (the entire United States portion of this river is located in the Pasayten Wilderness), and those portions of the Chewuch, Twisp and Lost Rivers, and Wolf Creek in wilderness.

What People Said - The public expresses concern over conflicts between range and recreation uses, with concerns centered around visual impacts of grazing. Some people feel their recreational experience is lessened if they see cattle and sheep or the effects of their presence in the wilderness.

People have also expressed concern over the building of dams in the wilderness.

ROADLESS AREAS

*HOW WILL THE OKANOGAN NATIONAL FOREST MANAGE ROADLESS AREAS?

Background - The future management of roadless areas will directly affect both the amount of timber volume the Okanogan National Forest can produce, and the amount of area remaining suitable for wilderness designation under future plans.

Although the Washington State Wilderness Act of 1984 determined that for those National Forest lands reviewed during RARE II, "that review and evaluation or reference should be deemed for the purpose of initial land management plans to be adequate consideration of the suitability of such lands for inclusion in the National Wilderness System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the plans." The option of future wilderness designation was not foreclosed.

Suitable roadless area may be designated wilderness in the future. Maintaining areas in an unroaded, natural appearing condition of sufficient size can maintain wilderness suitability.

The present roadless areas have not been contributing their share of timber volume to the Okanogan National Forest's annual harvest goal, even though the roadless area acres were used to determine that goal. This places a greater burden on the easier-to-access areas of the forest to provide that remaining volume, affecting the other resources in those areas.

These areas also provide a variety of recreation opportunities, wildlife habitat and large supplies of water.

Maintaining large blocks of roadless areas tends to discourage mining activities within those areas, because access is more difficult. This is also seen as beneficial by some.

What People Said - The public is concerned with how the remaining roadless areas will be managed. Specific areas of widespread interest are Tiffany, Beaver Meadows, Okanogan Highlands and Golden Horn. Some people feel that these areas should be managed as de-facto wildernesses, or allocated to unroaded recreation. Some people feel that timber management within these areas should proceed.

TIMBER MANAGEMENT

*WHAT IS THE APPROPRIATE TIMBER HARVEST LEVEL?

Background - The objectives of vegetative management directly affect the volume of timber that the forest can harvest each year and over the long-term. Retaining cover in deer winter range, snags for non-game wildlife, big trees for scenic vistas or open timber stands for range forage (to name a few), all affect timber yields.

Management for high timber yields in the short and long-term may cause reductions in some forms of wildlife habitat (for example, cover in deer winter range or snags) or reduce the scenic values of some parts of the forest. Timber harvesting at lower levels is necessary to provide wildlife habitat, large trees in scenic areas and open timber stands for range forage production.

The wood products industry is an important part of the Okanogan County economy. High harvest levels will provide employment in logging, manufacturing and related occupations. Large increases or decreases in timber offered for sale from the National Forest could be expected to result in increases or decreases in timber harvested in the area, and therefore affect the number of jobs generated in Okanogan County.

What People Said - Most comments express concern that the forest be managed on a sustained yield basis. Many people comment that the forest should maximize timber yield. Issues raised by the public are split between concerns over loss of jobs if a low harvest level is established, and concern about impacts to wildlife, visuals and other resources if a high harvest level is established.

HOW WILL WOOD WASTE BE UTILIZED?

Background - Timber harvest, construction of roads and the cutting of unwanted trees within young growing stands produce varying amounts of wood waste. Most of this material is in the form of branches, tree tops and broken tree trunks.

The wood waste material that remains on the site may act as a fire hazard, may impede successful regeneration of new trees on the site, or may act as a travelway barrier to domestic livestock and deer. On the other hand, retention of wood waste provides for nutrient recycling, wildlife habitat for small mammals, rodents and other non-game species, and shade for seedling survival on harsher growing sites.

Wood waste that remains on-site following activities is popular for firewood cutting. Large diameter standing snags and windfall outside timber sale areas are also popular for firewood cutting. Increasing public demand for firewood is reducing the number of standing snags and down logs required for maintenance of certain wildlife habitats, especially where closely spaced roads provide ready access to the firewood cutter.

What People Said - Most comments emphasize the desire for utilization or clean-up of slash following timber sales and thinnings. Fuel or firewood cutting and chipping are most often mentioned for slash utilization. Most people feel that burning slash is wasteful. A strong desire for more firewood cutting opportunities was expressed. Some people also mentioned that snags should be protected for wildlife habitat.

WHICH SILVICULTURAL TREATMENTS WILL BE USED?

Background - Silvicultural treatments greatly influence the scenic quality of an area. Uneven-aged management maintains forest cover at all times thereby lessening the visual impact of timber management. Even-aged management such as clearcutting and shelterwood cutting results in the removal of most understory vegetation. Clearcutting removes all trees, while shelterwood cutting retains mature trees on-site for a period of time until new trees become established. The mature trees are then removed.

The types of silvicultural treatments applied can directly affect costs and timber yields. Uneven-aged management may be more costly than even-aged management because residual trees must be protected. In most cases more volume per acre is harvested under even-aged management than under uneven-aged management.

The presence of insects or diseases may be affected by the silvicultural treatments. Treatments that create timber stands containing trees of many ages and sizes produce favorable conditions for the spread of forest insects and disease.

Silvicultural treatments may affect the long-term productivity of the soil. Treatments that require frequent re-entry often results in greater damage to forest soils.

What People Said - Some people favor selective cutting (a form of uneven-age management) rather than clearcutting (a form of even-age management). These comments stress the desire to maintain variety and not create a forest "monoculture." Other people emphasize the need to reduce logging costs through the use of even-age management. Many people are concerned about reforestation success after logging and urged planting to ensure regeneration.

WHICH LOGGING METHODS WILL BE USED?

Background - The logging methods chosen for a harvest site can greatly influence both the costs involved in logging and the amount of resource damage that occurs on a site. Cable and helicopter logging can mitigate potential impacts on compactible soils or steep slopes, because logs can be fully or partially suspended above the ground. Horse logging can also mitigate impacts on gentle ground because horses weigh a great deal less than tractors (the usual logging system on gentle ground). However, costs are greatly increased with any of these systems as compared to tractor logging.

There is also a correlation between logging system and access. If roads cannot be constructed or are too expensive to construct, a site may only be accessible by helicopter or long span skyline systems. This in turn increases reforestation and precommercial thinning costs.

Helicopter and horse yarding systems tend to cause less site disturbance and allow the retention of ground vegetation, which makes the site more visually pleasing following logging. However, following logging it is often necessary to remove much of the ground vegetation in order to reforest the site.

What People Said - Several comments received favor the use of horse or helicopter logging. Reasons for preference of these systems were not given, but the probable reasons are because these systems cause less site disturbance.

*HOW WILL LODGEPOLE PINE STANDS BE MANAGED?

Background - About 90,000 acres of the Okanogan National Forest outside of wilderness (approximately 10 percent of the total non-wilderness lands) are in dense, mature lodgepole pine stands. Forest entomologists predict that conditions are ripe for a major outbreak of mountain pine bettle in these stands within the next 10 to 20 years unless the stands are harvested. One result of this outbreak would be large volume losses in mature lodgepole pine stands.

The largest lodgepole pine areas on the forest are also habitat for what has been reported to be the highest density of lynx over the largest single area in the 48 contiguous states (Brittell, 1984). However, lynx numbers are declining because the species depends on early successional stages of lodgepole pine. The majority of existing lodgepole pine is now mature. A major outbreak of insects or fire would produce a boom or bust situation, where the lynx would have increased habitat (young lodgepole pine stands), but other species relying on later successional stages (mature) would be displaced. Later, when the trees matured, the lynx would again be on the decline.

Harvest of selected lodgepole pine stands at this time may forestall an insect outbreak. Creating a mozaic of successional stages throughout the lodgepole pines stands using prescribed fire or timber harvesting would benefit wildlife, especially the lynx.

The demand for lodgepole pine in Okanogan County historically has been low because of low harvestable volume, lack of developed access and lack of existing markets.

What People Said - This is mainly a management concern, except that lodgepole pine management relates to many other issues discussed in this section, such as roadless, lynx habitat and timber management costs. The large lodgepole pine stands are mainly located in roadless areas and currently provide habitat for declining lynx populations. Costs of developing access and harvesting in some stands may exceed the value of standing timber. Consideration of using prescribed burning should be made.

RANGE MANAGEMENT

WHAT IS THE APPROPRIATE LEVEL OF GRAZING ON THE FOREST?

Background - Conflicts can arise between grazing and recreation, wildlife and timber management. Domestic livestock and wildlife may compete for some of the same species of plants for food. Timber harvest usually results in opening or removal of the tree canopy, allowing understory vegetation such as grasses to flourish. These grasses either seed naturally or are seeded to enhance the area for grazing, erosion control or to prevent invasion by noxious weeds. This increase in understory vegetation creates "transitory range" suitable for domestic livestock grazing. However, encouraging livestock in these areas may result in delays in reforesting the area with trees.

What People Said - Some people feel there are currently too many restrictions on grazing, and want current levels of grazing maintained. Others feel that grazing should be further restricted or prohibited on National Forest System lands.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

HOW WILL THREATENED, ENDANGERED OR SENSITIVE ANIMALS BE MANAGED AND AFFECTED?

Background - The grizzly bear, bald eagle and gray wolf have historical range that covers all or part of the Okanogan National Forest. None of these species are known to reproduce on the forest, and only the bald eagle is seen with any regularity. No critical habitats for these species have been identified on the forest.

The Pacific Northwest Region spotted owl management plan (Regional Guide) directs National Forests in the Region include direction for spotted owls, but the direction is directed toward west-side forests. Furthermore, the Regional Guide is being supplemented and a different decision as to spotted owl management may result.

The northern spotted owl has gained widespread attention throughout the Northwest in recent years. This sensitive species is an indicator animal for old growth forests. As old growth is harvested, the population of these birds has been on the decline, which indicates a trend that other old growth dependent species are also being affected. Forest management is currently attempting to maintain "viable" populations of spotted owl. Disagreement has arisen on how much old growth is necessary to maintain a viable population, especially because most spotted owls have been found and traditional habitat is located west of the Cascade Crest.

What People Said - The public is concerned that species such as the grizzly bear, bald eagle, peregrine falcon, wolf and spotted owl be protected. Concern is expressed that populations, habitat and effects on these species be estimated and displayed, because opportunities to improve habitat may exist.

Forest personnel are concerned about the recovery of the grizzly bear and peregrine falcon and the management of the northern spotted owl.

RESEARCH NATURAL AREAS

*HOW CAN THE OKANOGAN NATIONAL FOREST HELP MEET IDENTIFIED NEEDS OF THE RESEARCH NATURAL AREA PROGRAM?

Background - The scientific community has expressed the need to provide for areas representative of different ecotypes for scientific research. The Pacific Northwest Region, Forest Service, has identified certain biological cells that this physiographic area should provide as Research Natural Areas (RNAs). The Wolf Creek Natural Research Area is the only RNA on the Okanogan National Forest. This RNA fulfills the need for the bitterbrush/bunchgrass biological cell.

What People Said - Many people have expressed the belief that both the Maple Mountain and Tiffany Mountain areas should be managed as Research Natural Areas.

WILDLIFE HABITAT MANAGEMENT

*HOW WILL THE OKANOGAN NATIONAL FOREST ENSURE THE MAINTENANCE OF BIG GAME POPULATIONS?

Background - Vegetation manipulation can greatly affect big game populations in the Okanogan National Forest. Timber management has reduced the amount, quality and distribution of cover for deer. This is especially true on winter range where road access for timber management is easier and more economical. However, timber management is also the primary tool for creating cover in the future.

Domestic livestock grazing both on and off the National Forest has reduced the supply of quality forage available for deer on winter range. Other potential areas of conflict between livestock and big game include livestock damaging wildlife habitat improvements, mutual use of riparian areas, grazing on aspen, seeding of exotic grasses that favor livestock over wildlife, territorial displacement of wildlife by domestic sheep, and potential for sheep to disturb fawning areas.

Increased access and recreation activities also have the potential to affect big game populations. Helicopter skiing, cross-country skiing, snowmobiling and hunting may increase harassment of big game animals.

What People Said - Public and forest personnel indicate that timber, recreation and range management have resulted in difficulties in maintaining big game populations, which include mule deer, white-tailed deer, bighorn sheep and mountain goats.

A major concern expressed is the belief that timber management activities have reduced the amount and quality of cover for deer, especially in low elevations where road access is easier and timber management is more economical. Also of concern is the distribution of forage and cover on the forest.

Increasing recreation access to big game winter range and travel corridors is of major concern to many people, as are conflicts between big game and livestock grazing.

Many people expressed concern that management direction will only maintain minimum big game wildlife populations rather than optimum or desirable wildlife levels.

*HOW WILL THE OKANOGAN NATIONAL FOREST PROVIDE HABITAT FOR SMALL GAME AND NON-GAME WILDLIFE SPECIES?

Background - Vegetation manipulation can affect small game and non-game populations. Timber management, firewood removal and prescribed burning have all reduced the supply of wildlife trees (snags and logs) and old growth timber stands that are imperative to the existence of many non-game species.

As explained in the timber section above, this forest has a large population of lynx, which are dependent on the early successional stages of lodgepole pine. Timber harvest can benefit the lynx and other lodgepole pine dependent species through providing a mosaic of successional stages.

What People Said - The public is concerned that timber management results in conflicts with maintenance of viable small game and non-game wildlife populations, for the same reasons listed in the big game issue above.

Concern is expressed that wildlife trees, including snags and down material (logs), are imperative to the maintenance of many non-game wildlife species.

Again, the public expresses concern that management direction will maintain only minimum small game and non-game wildlife populations rather than optimum or desirable wildlife levels.

Many people are concerned that timber harvest within the lodgepole plant association may adversely affect species dependent upon both that ecotype and plant communities found within the lodgepole areas, especially the lynx.

The maintenance of old growth is of particular concern to the public because many wildlife are dependent on this ecosystem.

FISH HABITAT MANAGEMENT

HOW WILL THE OKANOGAN NATIONAL FOREST PROVIDE HABITAT FOR ANADROMOUS FISH AND TROUT?

Background - Timber management practices of road building and logging can affect the amount of sediment introduced into fish bearing streams. Habitat for spawning and rearing can be covered by silt, resulting in the reduction of fish numbers, although this has not been a problem on this National Forest because the soils of this forest are relatively stable and applied mitigation measures have been successful.

Road building also results in easier access to fish bearing streams, which usually results in increased recreational fishing.

What People Said - The general public, the Colville Confederated Tribes and the State of Washington, Departments of Fisheries and Game express concern about fish populations. Concern focuses on the effects of timber management, sedimentation and increased recreation access upon fisheries.

ECONOMICS

*HOW CAN THE OKANOGAN NATIONAL FOREST INCREASE ECONOMIC EFFICIENCY?

Background - Concern has been growing that the National Forests should be managed in a more economically efficient manner. But economic efficiency is defined differently by different people.

What People Said - People define economic efficiency differently; some people want decreased government costs and some want increased service for current costs. Some people want decreased logging costs in order to increase private business profitability. Others want increased receipts to the U.S. Treasury and to Okanogan County. One particular concern raised is for the cost efficiency of uneven-age timber management, as opposed to even-age timber management.

*WILL TIMBER BE HARVESTED WHERE HARVEST IS NOT COST EFFICIENT?

Background - The Okanogan National Forest has several thousand acres of forest land suitable for timber management which have high timber harvesting costs. In these areas, the costs of harvest, including logging, fire protection, reforestation and road construction, may exceed returns to the U.S. Treasury on a sale by sale basis. Often costs may be increased by measures taken to protect valuable wildlife habitat, or to mitigate impacts on other resources such as watershed scenic quality or seasonal recreation users, and to develop areas for long-term use.

There is growing feeling that the Forest Service should only provide goods and services where dollar returns exceed dollar costs. However many people feel that the Forest Service has a responsibility to continue to provide at least the current level of jobs in the community.

What People Said - This issue has become increasingly important to many people, especially in management of marginally productive lands where the costs of timber management can exceed returns to the U.S. Treasury from timber stumpage. Many comments favor harvesting timber only where timber receipts are greater than costs.

*WHAT WILL BE THE ECONOMIC EFFECTS UPON LOCAL PEOPLE?

Background - As explained under the "timber harvest level" issue above, decreases or increases in timber offered for sale from the National Forest can be expected to result in decreases or increases in the timber harvested in the area, and therefore affect the number of jobs generated. The maintenance or increase in jobs related to forest management is a major concern of the local community. Okanogan County is one of the more economically depressed areas in the State of Washington.

What People Said - Many comments from the public express concern that the Forest Plan not result in the loss of jobs, and that the Plan, if possible, increase commodity production to increase the amount of jobs. Most people commenting on this issue want the timber harvest level either maintained or raised to maintain the current level of jobs or create new jobs.

SOCIAL

WHAT WILL BE THE SOCIAL EFFECTS ON LOCAL PEOPLE?

Background - This issue concerns how the Forest Plan will affect lifestyles in Okanogan County. The area is currently rural in character, and many newer residents have moved there to "escape" urban life. They and other residents are concerned that decisions made in the Forest Plan not degrade the high quality of life they currently enjoy.

What People Said - Local residents express concern about the effect that the Forest Plan would have on the quality of life. Air quality, wildlife, water quality, population levels, recreation and jobs are some of the quality of life issues which the Forest Plan can affect that are important to these people.

RECREATION

HOW WILL THE OKANOGAN NATIONAL FOREST PROVIDE FOR WINTER RECREATION OPPORTUNITIES?

Background - The primary winter recreation uses include downhill skiing at the Loup Loup Ski Area, cross-country skiing, snowmobiling, helicopter skiing and winter mountaineering. Cross-country skiing is generally compatible with the recreational experience desired by people using snowmobiles, but the reverse is not always the case. Some cross-country skiers desire peace and quiet in a natural setting; the noise created by snow machines is incompatible with this type of experience. This can lead forest managers to designate areas open to only one of the activities, thereby limiting access to the other activity. In contrast, snowmobiles may complement cross-country skiing for many users by providing tracks that allow skiers easier gliding on trails.

Winter logging is widely used on the Okanogan National Forest, and is sometimes required to meet management objectives. This results in timber sale purchasers plowing snow from the roads leading to sale areas. When this happens on roads groomed or marked for cross-country ski trails or snowmobile routes, conflicts arise or winter recreation opportunities are lost.

What People Said - The public expresses the desire for management direction regarding ski touring, cross-country ski trails and snowmobiling, especially in the Methow Valley area. The concern is over providing for both cross-country skiing and snowmobiling within the same areas. People also express concern over conflicts between snowmobiling and logging traffic on groomed and/or marked snowmobile routes.

People also desire additional parking and shelters.

HOW WILL THE OKANOGAN NATIONAL FOREST PROVIDE FOR OFF-ROAD VEHICLE (ORV) USE WHILE MAINTAINING OTHER RECREATION OPPORTUNITIES?

Background - The use of motorcycles and 4-wheel drive vehicles on the forest can lead to conflicts between motorized and non-motorized recreation users. Hikers and horseback riders generally find motorized use on trails incompatible with the natural environment they enjoy. Motorized vehicles can frighten horses. Decisions may be made to limit trails open to ORVs in order to lessen conflicts; the ORV user may then feel discriminated against and that not enough area is being provided for the enjoyment of their activity. A majority of the trails on the forest are either in wilderness or lead to wilderness and are closed to motorized use. This leaves very few trails available for ORV use.

What People Said - During public involvement, some people expressed concern over the lack of existing ORV opportunities, while others wanted ORV use further restricted or prohibited on the the forest.

HOW WILL THE OKANOGAN NATIONAL FOREST PROVIDE FOR A VARIETY OF RECREATION OPPORTUNITIES?

Background - The variety of recreational opportunities has been expanding in recent years as more and more people have been trying a wide variety of activities. Recreationists may have one or more special niches into which their feelings on recreation experience fall. Some people wish to see more developed recreation sites for car or motorhome camping, while others prefer tent camping in isolated dispersed recreation sites. Still others seek a wilderness experience, carrying their camping needs on their backs.

What People Said - The majority of comments regarding this issue emphasize the desire to continue providing a full spectrum of recreational opportunities, from highly developed to primitive.

The majority of the people who mentioned facilities management want existing campground and trails maintained, and many would like to see additional facilities and trails provided. Many people express concern that trails are not maintained, signed or mapped adequately.

SCENERY

*WHAT EMPHASIS WILL BE GIVEN TO SCENERY?

Background - The Okanogan National Forest is well known for its unique and beautiful scenery. Maintaining a natural or nearly natural appearing landscape places restrictions on the amount, type, frequency and cost of vegetative manipulation (primarily timber harvest) in an area. The amount of area allocated to a scenic designation directly affects the timber harvest goals of the forest. This may in turn affect the economic community in terms of the number of jobs available in the wood products industry.

Timber harvest can be used to enhance scenic quality through the creation of visual variety or vistas. Timber harvest can also be used to rehabilitate areas where the existing visual quality is unacceptable.

Scenic designation can be beneficial to other resources. By reducing harvest levels, habitat for some wildlife and water quality are maintained, and recreation is enhanced.

Access can be affected by scenic designations. Traditional road design often cannot meet a high visual quality level when viewed in the foreground. The road design may have to be altered (narrowed, or to follow the lay of the land). Economically feasible roads may be impossible to design to the required visual quality level. In this case, helicopter access may be required to achieve desired visual quality levels.

Access and vegetative management restrictions needed to create visually pleasing landscapes can greatly increase logging, fuel treatment, reforestation and precommercial thinning costs, or in some cases, eliminate their feasibility.

What People Said - The public expresses concern that the corridors along existing major roads and highways be managed to maintain scenic quality. The Chewuch River corridor is most often mentioned for retention of scenic values.

*HOW SHOULD THE NORTH CASCADES SCENIC HIGHWAY BE MANAGED?

Background - The North Cascades Scenic Highway was established through the Washington Wilderness Act of 1984. Congress designated the highway corridor for preservation of scenic value. Congress directed the Okanogan National Forest to develop management direction for the area that recognizes the scenic values as part of the Forest Plan.

Congress did not specifically prohibit timber harvest or mineral entry in the area, but stated that any activities would have to maintain existing scenic values. This leaves a range of options open to forest planners, from allowing scheduled timber management or mineral exploration with roads, to maintaining the area in a semi-primitive, unroaded state (except the highway and current trailhead and campground developments), and withdrawing the area from mineral entry. The key phrase here is "existing scenic values."

What People Said - Most public input regarding the North Cascades Highway area was received before the North Cascades Scenic Highway was established by Congress. Therefore input was given as a general "scenery" issue, which is explained above. Comments received subsequent to the establishment of the Highway range from the feeling that no activities should occur, to the feeling that existing scenic values can be maintained while permitting timber harvest, mineral exploration and roading activities.

WILD, SCENIC AND RECREATION RIVERS

WHAT RIVERS SHOULD BE DESIGNATED AS WILD AND SCENIC RIVERS?

Background - In order to maintain the wild, scenic and recreational qualities of nominated or designated rivers, the Wild and Scenic River Act states that such rivers "shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations." This can best be achieved by managing the drainage in which a river flows as a "Scenic Viewshed" or "Semi-Primitive" area. Please refer to the "Scenery" issue above for conflicts and complementary relationships involved in scenic viewshed management.

What People Said - Many people support protection of the wild, scenic and recreation values of the Methow, Chewuch, Twisp, Lost, Pasayten, and West Fork San Poil rivers, and Wolf Creek.

CULTURAL RESOURCES

WHAT PROTECTION WILL BE GIVEN TO HISTORICAL SITES?

Background - The Wilderness Act of 1964 states that wilderness is "an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation..." The Act also states that wilderness may contain "...features of scientific, educational, scenic, or historical value." Cabins in the Pasayten Wilderness have not been evaluated as to their historical value.

What People Said - The public generally expresses the desire to preserve historical sites within the wilderness and backcountry areas, and in particular cabins in the Pasayten Wilderness. Forest personnel are concerned that the presence of cabins is concentrating people in the vicinity of the structures and resulting in degradation of the vegetation and soil in the area. The public would like to see the cabins retained for aesthetic and historical reasons and for use by recreationists.

MULTIPLE USE

HOW WILL MULTIPLE USE OF THE OKANOGAN NATIONAL FOREST BE PROVIDED?

Background - The Multiple-Use Sustained-Yield Act of 1960 states that "'Multiple use' means the management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people."

What People Said - The public expressed the desire for a variety of resource uses on the forest, and most of the people mentioning this issue indicated a desire for more development. The many reasons given for support of "multiple use" indicate an association with commodity uses and the increase of or impact on employment levels. Other reasons given for support of "multiple use" state specifically that other resources should be given as much consideration as timber production or recreation.

RPA

WILL THE OKANOGAN NATIONAL FOREST BE ABLE TO SIMULTANEOUSLY MEET ALL RPA TARGETS?

Forest managers are concerned that the targets assigned in the 1985 to 2030 Resources Planning Act DEIS are unreaslistic to meet, *simultaneously*. Each target by itself can probably be met. But targets such as increasing deer numbers and increasing the timber harvest may not be simultaneously attained.

MAJOR ISSUES AND CONCERNS NOT WITHIN SCOPE OF THIS EIS

Contributors to the issues, concerns and opportunities also identified topics that were not considered further in the planning process because they are not within the scope of this Environmental Impact Statement. These are discussed in Chapters II (Alternatives Considered But Eliminated From Detailed Study) and IV (Unchanged Conditions) and Appendix A.

PLANNING RECORDS AND AVAILABILITY

All documents and files that chronicle the Okanogan National Forest planning process (including the environmental analysis) are available for review during office hours at the Supervisor's Office, 1240 South Second Avenue, Okanogan, Washington 98840. These documents and files, or "planning records," contain the detailed information and decisions used in developing this DEIS and the Proposed Forest Plan. The planning records are referenced at appropriate points in the text and appendices of this DEIS and the Proposed Forest Plan.

A glossary defining terms, units and abbreviations is located at the back of this document, just ahead of the Index. A list of references cited in the DEIS is provided. The reader will find it useful to consult the land management allocation maps for each alternative and resource inventory maps when reviewing this DEIS. The maps are in a separate envelope accompanying this DEIS.

Chapter II

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

INTRODUCTION

This chapter is the heart of the Environmental Impact Statement. Alternate ways of managing the National Forest (the alternatives) are presented and their resource outputs and environmental effects displayed. This chapter also discusses how these alternatives were developed, and how they compare to each other, including the current way the forest is managed.

This chapter draws on material from later chapters. Chapter III describes the Affected Environment. Chapter IV presents the Environmental Consequences.

OVERVIEW

This chapter is divided into three main parts. The first is a summary of the analysis used to develop the alternatives. A more detailed presentation of this analysis is presented in Appendix B, Description of the Analysis Process. The second part contains descriptions of the purpose and management emphasis of the alternatives.

The third part compares the alternatives in terms of the issues and concerns, emphasized land uses, resource outputs, environmental effects, and the economic costs and benefits that will occur with each alternative. Following the tables which extensively display this information, are other tables and a narrative that describes comparative differences among alternatives.

ALTERNATIVES

The alternatives considered in this Draft Environmental Impact Statement display different ways of managing the lands and resources of the Okanogan National Forest. They differ from each other in the land uses and management practices which would occur on different parts of the National Forest. They also differ in their schedules of management activities.

Each alternative is a unique combination of management area prescriptions and activity schedules. As a result, each alternative would generate a different mix of goods and services for the public, and a different combination of resource outputs, land uses and environmental effects.

An even distribution of reasonable alternatives covering a broad range of possible actions was formulated by the interdisciplinary team. In formulating these alternatives, they were guided by several considerations.

The planning regulations [36 CFR 219.12(e) and (f)] require an analytic process which includes an inspection of various minimum and maximum production levels and economic factors. In addition, the collection of alternatives must respond to public issues and management concerns, and include alternatives which reflect current and National programs, such as the Resources Planning Act (RPA).

Some alternatives would manage the National Forest to maximize the production of priced commodities such as timber and range, whereas other alternatives emphasize unpriced amenities such as dispersed recreation and aesthetic qualities. One alternative (the "No-Action" Alternative) reflects current management direction, while another (the RPA Alternative) reflects the objectives of the Forest Service National Program. Two of the alternatives depart from non-declining even-flow to meet specific objectives. These are referred to as "departure" alternatives. From this broad range of alternatives, the Regional Forester has a basis for identifying the alternative which comes nearest to maximizing the net public benefits.

"Benchmarks" are presented and discussed several times in the chapter. Benchmarks are analytic bases from which the alternatives were developed. They were used to analyze certain relationships under special economic and resource production assumptions. Their character and use will be discussed in the next section.

PROCESS USED TO DEVELOP ALTERNATIVES

Formulating a broad range of reasonable management alternatives for a National Forest is an extensive and complex process. Each alternative is a combination of land uses, forest management activities and schedules. Alternatives must consider public issues and management concerns, and the resource capabilities (both the limitations and the potentials) of the many different areas of the forest. Each alternative is designed to manage the land to achieve some goals and objectives. Some of these objectives, such as maintaining air and water quality, are common to all alternatives; other objectives, such as the resource outputs, vary among the alternatives.

Maximizing net public benefits is a goal of the Forest Planning process and a consideration in the development of alternatives. Net public benefits is the overall value to the Nation of all outputs and positive effects (benefits) less all the associated Forest Service inputs and negative effects (costs), whether they can be quantitatively valued or not. Conceptually, net public benefits is the sum of the present net value of priced outputs plus the net value of all non-priced outputs. Net public benefits are maximized by the alternative which has the greatest excess of benefits over costs. A major objective of the Forest Planning process is to provide information that helps determine which alternative provides the mix of outputs and effects that best responds to the issues and concerns while maximizing the net public benefit of managing the National Forest.

When dealing with net public benefits, two general types of outputs and effects are addressed by the alternatives. One is priced outputs such as timber which can be exchanged in the market place. The other is non-priced, such as water or visual quality for which there is no available market transaction evident to establish a monetary value. Both priced and non-priced outputs are considered in the formulation of alternatives.

Alternatives must be developed within the framework of the forest's capability and supply potentials. The supply potential for important priced and non-priced outputs are displayed later in this chapter in Table II-3c.

By managing the forest lands and resources in different ways, varied objectives can be achieved which respond to different issues, thus providing different combinations of public benefits. Forest management can vary by what is done, where it is done, and when it is done. These varying combinations of management activities, management areas and schedules will result in different resource outputs and environmental conditions, thus meeting the unique goals of the alternatives.

An alternative is formulated by considering all of the following factors:

- the resources available on different areas in the National Forest;

- the public's need or demand for different combinations of amenities;
- the management actions planned for different areas ("management prescriptions");
- the schedule of those activities;
- the interrelationship of capabilities, management prescriptions and schedules which result in resource outputs and environmental conditions which are consistent with the objectives of that alternative.

MATHEMATICAL MODEL (FORPLAN)

A large, computerized, mathematical simulation model of the forest was used to help analyze many of these factors and their interactions. This model, called FORPLAN, also assisted in selecting that particular combination of lands, management prescriptions and activity schedules that will best meet the objectives of each alternative.

FORPLAN, which is a "linear program" model, is designed to simulate the actions of the different resources, management and environmental conditions on the forest. It is also designed to find the "optimum" solution to a problem posed by the potentials and limitations of the land and resources, the effect of costs, budgets and resource prices, and the desired objectives of resource outputs and environmental conditions.

The FORPLAN model is structured to seek the greatest economic efficiency. This is represented in its function of "maximizing PNV." "PNV" or "present net value" is the value of the estimated flow of present and future monetary benefits after subtracting present and future monetary costs. FORPLAN is thus able to predict some forest-wide accumulative quantitative effects. It also predicts monetary costs and benefits under the conditions specified to achieve the objectives of a particular alternative.

The interdisciplinary team (IDT) was directly involved with the design, operation and interpretation of the FORPLAN model. The land and resource base was stratified into land units or classes called analysis areas. Alternative management activities ("management prescriptions") were developed for each of these units. The FORPLAN model examined these data and reported the assignment of prescriptions to analysis areas and a schedule of activities. The IDT assures that the model has correctly represented the objectives and constraints assigned to the model, and that results are feasible and implementable.

The process for formulating alternatives involves considerable analysis of all the resources and environmental conditions. It involves the examination of the National Forest as though managed to meet different goals and objectives.

Before using the FORPLAN model, other analytic techniques were used to specify the parameters and constraints required to use or supplement the FORPLAN model. After FORPLAN analysis, other analysis is conducted to aid in interpreting the results.

In some cases, the IDT found that the National Forest cannot be managed to meet a particular combination of objectives. When this occurred, the interdisciplinary team modified the objectives and made other "runs" of the FORPLAN model to find the particular combination of lands, activities and schedules which would best meet the goals of that alternative. Other analytic techniques were employed following a FORPLAN solution to validate that solution and to develop economic and other information about its implementation.

DESCRIPTION OF THE ANALYSIS PROCESS

Appendix B describes the entire analysis process in detail. Readers are encouraged to refer to that Appendix for technical information not found in the more general description presented here in this chapter.

The analysis used in formulating the alternatives is guided by the planning regulations [36 CFR 219.12(e) and (f)].

The analysis process begins with the inventory of the character, potentials and limitations of different land areas of the forest. An area of the forest which has fairly uniform characteristics is identified as an "analysis area." These are the basic geographic units of analysis. They are subdivisions of the forest having similar characteristics of costs and natural responses to forest management activities.

Analysis areas used in the analysis on the Okanogan National Forest are not contiguous. Hence, an analysis area with a certain designation may be found at many locations on the forest, but the same land characteristics are found at each of those locations. When the analysis indicates a reasonable and implementable alternative had been formulated, the combination of analysis areas for a given management prescription form the basis for "management areas."

During formulation of the FORPLAN model, certain assumptions were used to remain within the capabilities of the model. No distinction was made between immature stands which had been precommercially thinned and those which had not been thinned. Existing shelterwood harvested timber stands were combined with uncut stands for modeling. Two story stands containing merchantable volume with healthy understory trees were combined with two story stands with diseased understories. This resulted in only regeneration options being available for two story timber stands. These assumptions have little impact on first decade timber harvest levels. Acres harvested during the first decade may be somewhat underestimated in all alternatives because all harvests were modeled as regeneration cuttings. Harvest levels predicted by FORPLAN in each alternative for the third through seventh decades are probably slightly low because the model does not recognize and take advantage of precommercial and commercial thinning opportunities in existing timber stands. These simplifications will probably result in a slight underestimation of present net value in all alternatives. Attainment of the Long Run Sustained Yield harvest level in all alternatives may occur somewhat sooner than predicted by FORPLAN.

Management areas are areas of the forest to which a set of management practices, standards and guidelines apply. Management areas have been identified for each of the alternatives on maps which accompany this DEIS. The management areas are described later in this chapter, and their acreages are shown in Table II-2.

In conjunction with the creation of analysis areas and management areas, the interdisciplinary team generated "management prescriptions" which apply to specific analysis areas and management areas. They consist of two parts. To direct on-the-ground management, standards and guidelines for management were written and/or incorporated from the Regional Guide. Mathematical estimates of their direct economic costs and resource yields were generated for use in the FORPLAN model.

Having identified areas for analysis and management, and having prescribed the appropriate management practices and their mathematical expressions for use in the FORPLAN model, the interdisciplinary team proceeded with the following process of analysis in the formulation of alternatives.

BENCHMARK ANALYSIS

Benchmarks were created and their outputs, costs and assumptions were evaluated. Benchmarks are similar to alternatives in that they are a combination of land capability, management practices and schedules to achieve certain objectives. But unlike alternatives, they are usually not capable of actually being implemented because each lacks a consideration of one or more of the following: likely budgets, specific geographic locations, environmental effects, compliance with management regulations, legal requirements or other implementation factors. They do provide significant information about the maximum biological and economic production opportunities; they assist in evaluating the compatabilities and conflicts between market and nonmarket objectives; and they define the range within which integrated alternatives will be developed.

Some benchmarks are economically based, while others indicate the maximum physical productivity of land for various resources. In these benchmark analyses, some options must include meeting minimum management requirements of 36 CFR 219.27, such as protecting the productivity of the land and meeting minimum air and water quality standards. Benchmarks are described further in Appendix B.

There are several benchmarks that are required by the regulations [36 CFR 219.12(e)] and National direction. They include:

- Minimum Level: This benchmark specifies the minimum level of management which would be needed to maintain the Okanogan National Forest as part of the National Forest System.

- Maximum Present Net Value Based on Established Market Price: This benchmark specifies the management of the Okanogan National Forest which will maximize the present net value of those outputs that have an established market price.

- Maximum Present Net Value Including Assigned Values: This benchmark specifies the management which will maximize the present net value of those outputs that have either an established market price or assigned monetary value.
- Current Level: This benchmark specifies the management of the National Forest most likely to be implemented in the future if current direction is followed. This benchmark forms the basis for the "Current Direction" (or No Action) alternative.
- Maximum Resource Levels: Each of these benchmarks estimate the maximum capabilities of the forest to provide a single resource emphasis level.

  Timber
  Range
  Wildlife
  Roaded Recreation
  Unroaded Recreation

Other benchmark analysis determines the effect of various minimum management requirements, discretionary constraints and the effect of restricting timber harvest rotations to the culmination of mean annual increment (CMAI) and of non-declining flow (NDF) of timber harvest.

If a benchmark appeared to respond to issues, concerns and opportunities, further analysis is conducted to examine it as a potential alternative. Thus, some benchmarks are the basis for alternatives. Others display too many environmental, fiscal, legal and practical problems in the analysis and are eliminated from detailed study.

By inspecting the information generated by the benchmark analysis and the analytic limits and reference points identified by the various benchmarks, the interdisciplinary team can proceed with constructing alternatives which could be implemented on the forest.

REQUIRED ALTERNATIVES

Some alternatives formulated by the IDT are required by regulation and National and Regional direction. The required alternatives are listed and briefly described here.

- Current Direction (No Action): Alternative A is the "No-Action" alternative required by the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.14) and by the NFMA Planning Regulations (36 CFR 219.12(f)). This alternative would continue the management of the Okanogan National Forest as defined by existing direction in approved management plans; continuation of existing policies, standards and guidelines; current budget updated for changing costs over time; and, to the extent possible, production of current levels and mixes of resource outputs.

- Emphasis on the Current RPA Program: Alternative B will determine how the Current (1980) RPA Program distributed to the forests through the Regional Guide can best be implemented.

- Emphasis on Nonmarket Opportunities: Alternative C emphasizes water, fish and wildlife, dispersed recreation and other amenity values. Management for other resources will be at economically and environmentally feasible levels consistent with the emphasis on amenity values.

- Emphasis on Market Opportunities: Alternative D emphasizes outputs that have an established market price (timber, livestock range forage, commercial fish, developed recreation opportunities and minerals). Management for other resources will be at economically and environmentally feasible levels consistent with the emphasis on market-oriented outputs.

DEPARTURE ALTERNATIVES

Two alternatives are "Departure" Alternatives. Alternative A (current direction) is departure. The 1969 Timber Management Plan calls for departure from non-declining even-flow. Alternative G (departure) has the same land allocation and resource management prescriptions as Alternative G which it is based upon. The timber harvest schedule in Alternative G (departure) departs from one which would result in a non-declining flow of timber. Management under departure alternatives would result in higher volumes of harvested timber in the near future, but have lower volumes of timber available in the intermediate future (20 to 60 years).

OTHER ALTERNATIVES

Additional alternatives, including those necessary to respond to the full range of public issues, management concerns and resource use and development opportunities, were formulated to reflect a broad range of resource outputs and expenditure levels. Additional alternatives respond to 36 CFR 219.12(f)(1). The regulations require alternatives to "be distributed between the minimum resource potential and the maximum resource potential" to display the "full range" that a National Forest could produce. The other alternatives are listed and briefly described below:

- Emphasis on Maintenance of Existing Roadless Areas and Intensive Timber Management of Developed Lands - Under Alternative E the existing roadless areas would remain undeveloped and would continue current contributions to wildlife habitat, water quality and dispersed recreation opportunities. All roadless areas would remain suitable for future classification as wilderness. On lands already developed, intensive timber management activities would be applied to maximize the yield of timber products.

- Emphasize Methow Mule Deer/Minimize Timber Program Costs - In Alternative F, management activities would be selected which would enhance habitat conditions for mule deer in the Methow Valley. Timber management activities would be conducted to minimize costs, such as harvesting primarily on ground suitable for tractor yarding, relying on natural regeneration and foregoing thinnings that may not be cost-effective. Management of other resources would be at levels shown to be economically and environmentally feasible.

- Emphasize Balanced Mix Between Timber, Wildlife and Dispersed Recreation - The goals of Alternative G are to maintain the timber harvest level while simultaneously providing quality wildlife habitat and dispersed recreation opportunities in key areas. Lodgepole pine stands would be treated to forestall mountain pine beetle attack and improve lynx habitat. These goals are not totally compatible, so the alternative strikes a balance among them. Alternative G (departure) was also formulated to meet the above mentioned goals, plus the additional goal of phasing in a reduced harvest level to enable the local industry to adjust capacities.

- Emphasize Balanced Mix Between Timber and Wildlife Program - In Alternative H the primary emphases are timber production and wildlife habitat. Other resource uses will be managed in a manner shown to be environmentally and economically feasible, and not in conflict with the primary emphases.

- Emphasize Roadless for Future Wilderness Designation, Wildlife and Visuals along Selected Road Corridors - The goals of Alternative I are to retain roadless areas for future consideration as wilderness, emphasize wildlife habitat and maintain visual quality along selected road corridors.

THE PREFERRED ALTERNATIVE

A Preferred Alternative is identified. The selection of the Preferred Alternative was made only after careful comparison of all the alternatives on the basis of their resource outputs, environmental effects, implementation costs, and the "trade-offs" between them. The Preferred Alternative is that alternative which was selected from all those formulated as the one which best maximized the net public benefits in an environmentally sound manner. After the Forest Supervisor reviewed the interdisciplinary team's evaluation, and after the Regional Forester and his staff had reviewed the alternatives, this alternative was selected as the Preferred Alternative in this draft EIS.

Alternative G (departure) is the Preferred Alternative.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

The interdisciplinary team considered several alternatives which were eliminated from detailed study. These alternatives are:

1. Benchmarks.
2. Alternatives outside the Agency's authority.
3. Alternatives to higher level plans.
4. Alternatives to decisions incorporated by reference.

BENCHMARKS

The benchmarks analyze the ability of the Okanogan National Forest to supply goods and services. They allowed the interdisciplinary team to review the outer limits of potential production, and to learn more about the relationships among the various resources and activities. The benchmarks were not developed in response to the Issues, Concerns and Opportunities. Rather, they were an analysis tool used in the formulation of alternatives and subsequent evaluation. Standing alone, they generally could not be implemented due to lack of geographic specificity, and failure to meet all legal requirements.

The benchmarks for Maximum Timber, Maximum Range and Maximum Developed Recreation were the basis for the alternative which emphasized Market Opportunities. The Roadless Area Benchmark was the basis for Alternative E. Optimal Wildlife Benchmark weighed heavily in the formulation of Alternatives C and H.

WILDERNESS

As indicated by results of the public involvement process, some people feel additional areas of the forest should be classified as wilderness. Conversely, some people have stated we already have too much wilderness.

This DEIS does not contain alternatives that would alter the amount of established wilderness on the Okanogan National Forest. The roadless areas are, however, evaluated for alternative levels of development, including preserving the existing conditions. Also, the existing wilderness areas are evaluated for alternative levels of recreation development.

REGIONAL GUIDE

Alternatives to decisions made by the Regional Forester in the Regional Guide were eliminated from detailed re-examination. Those decisions are:

1. Uniform standards concerning selection of harvest cutting methods and determining maximum size, size variation, dispersal and duration of tree openings;

2. More complete and efficient utilization of wood fiber;

3. More effective means to identify potential sources of air pollution and to coordinate air quality control;

4. Coordinated utility and transportation corridor policies; and

5. Effective and efficient provisions for maintaining viable populations of northern spotted owls.

METHODS OF MANAGING COMPETING VEGETATION

In 1981, the Regional Forester made a decision to maintain a variety of techniques, including the use of herbicides. Site specific analysis is required prior to application of any technique and this programmatic forest plan is not that site specific analysis. A Federal Court decision regarding this EIS injuncted the Forest Service from using herbicides until a worst case analysis is performed.

EARLY WINTERS

The land use of Sandy Butte is fixed for all alternatives because the July 5, 1984 Regional Forester decision concerning it is incorporated herein. On July 5, 1984, the Regional Forester signed the Record of Decision for the Early Winters Alpine Winter Sports Study. Implementation of his decision would result in the construction and operation of a major downhill ski resort on approximately 3,900 acres of the Okanogan National Forest. The decision was appealled but the decision was sustained by the Chief of the Forest Service. At the time of this writing litigation is pending.

The outcome of the litigation and the effect it might have on implementing the decision of the Regional Forester may not be known for some time. While this introduces some uncertainty, considerable analysis has been conducted in the Final EIS for Early Winters. For further information, the reader is encouraged to review the Early Winters Final Environmental Impact Statement published in 1984.

If the the decision of the Regional Forester is upheld by the Federal Court System, then implementation will be guided by the Record of Decision for Early Winters. If not, the area covered by the Early Winters decision would be managed for its recreation values. Potential for winter sports development would be maintained. Further review would occur through the Forest Land Management Planning process at either the next round of planning 10-15 years hence, or through a supplement or amendment to this Environmental Impact Statement and Forest Plan.

ALTERNATIVES CONSIDERED IN DETAIL

The alternatives considered in detail demonstrate different ways of managing the land and resources of the Okanogan National Forest. Each is a combination of land uses, management practices and activity schedules which results in a unique combination of resource outputs, land uses and environmental conditions.

These alternatives together present a broad range of reasonable management alternatives. They were formulated through an analysis process that explored a wide array of possibilities shown in the benchmarks and in the required alternatives.

Each alternative has a set of goals and output objectives. These are designed to respond to public issues and management concerns. Table II-1 presents the response of each alternative to all the issues and concerns.

Each alternative distributes the lands of the forest to different management areas. Acreages in the different management areas vary from one alternative to another (see Table II-2). A description of the management areas and the goals of land and resource management in them is presented later in this chapter in the discussion preceeding Table II-2. Locations of the management areas for each alternative are shown on the maps which accompany this DEIS.

Harvest systems (even-aged or uneven-aged management) vary between management areas. Harvest systems used will be determined following site specific analysis according to standards and guidelines which apply to the preferred alternative. In all alternatives, clearcutting would only be prescribed following an analysis that determined it is the optimal harvest method. Criteria for determining clearcutting is the optimal method is contained in Appendix J.

The management areas are subject to management according to specified standards and guidelines. Standards and guidelines deal with potentially adverse environmental effects, and attempt to mitigate them by avoiding, minimizing, rectifying or reducing them. Some of these standards and guidelines were developed by the interdisciplinary team to specifically respond to environmental conditions on the Okanogan National Forest. Others are adopted from the Regional Guide. They are presented or referenced in the accompanying Forest Plan.

The protection of the Okanogan National Forest from the negative effects of wildfire is a basic responsibility associated with management of National Forest land. Standards, guidelines, and practices have been developed, based on resource management goals, objectives and Forest Service policy which documents the protection level required for each management area on the Forest. This fire management direction defines the kind, level and timing of fire protection (re. wildfire suppression) needed to most efficiently meet overall management objectives of each management area. This is accomplished through the identification of the most appropriate suppression response for each management area. The three response levels used are confinement, containment, and control (See glossary for definition of terms).

The protection policy is based on minimizing suppression costs and resource value loss. The basic difference among alternatives is the total number of acres under each suppression strategy (re. confinement, containment, and control). This difference is based on whether the roadless area acres are allocated to a semi-primitive recreation prescription which utilizes confinment or to a prescription which emphasize commodity production with scheduled resouce output objectives. The latter prescriptions have identified control as the most appropriate suppression response because of the assigned resource outputs associated with the prescription. See Appendix B, Table B-1 for the protection strategy assigned by the Interdisciplinary Team for each management area.

The management of the National Forest according to the different alternatives would result in various land uses, resource outputs and environmental effects. Some differences among alternatives represent the specific objectives of the alternative. All of the major land uses, environmental effects and resource outputs are presented by alternative and by time period in Table II-3a and Table II-3b. Table II-3a presents those uses, effects and outputs which are quantified; Table II-3b, those which are qualitative.

The following alternatives were selected for detailed study. They represent a broad range within the decision space identified by the benchmarks. These alternatives will direct management on the forest for the next 10-15 years, if not amended prior to that time. At the end of this planning period, the Plan will be revised.

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ALTERNATIVE A

This alternative is the **NO ACTION ALTERNATIVE** required by NEPA regulations and represents a continuation of current management direction as defined by the existing land use and functional resource plans identified on page I-4. This alternative also meets the Pacific Northwest Region planning requirements to formulate a departure alternative.

The goal of Alternative A is to emphasize visual quality in visually sensitive areas of the Okanogan National Forest while providing a high level of timber outputs and recreation opportunity. Other resources are provided at levels which maximize present net value. Because this alternative portrays direction from existing plans, the alternative does not contain the minimum management requirements (MMRs) spoken to in the Regulations promulgated from the National Forest Management Act. It is the only alternative that does not incorporate MMRs.

A moderate level of timber would be harvested in the next decade span [about 74 million board feet (MMBF) per year, 14 million cubic feet (MMCF) per year] under this alternative. This alternative would depart from non-declining even-flow. This means that the timber harvest level (in cubic feet) would decline after the next decade, and would not regain the first decade level of harvest until the tenth decade. The majority of timber management activities would occur in mixed conifer stands. Lodgepole pine and low productive stands would only contribute a minor amount of volume. Approximately 1 MMBF (.2 MMCF) of lodgepole pine would be included in the annual timber sale program. Generally timber management activites would employ cost effective methods. However, to meet the scenic and wildlife objectives in individual areas, the dollar cost of timber management activities may exceed revenue produced. Even-aged management would be practiced in most mixed conifer and lodgepole pine stands. Uneven-aged management would generally be practiced in low productive stands. Harvest unit sizes would be small to moderate. Mixed conifer stands managed for scenic quality and wildlife habitat would be grown to ages in excess of 140 years. Insect and disease in mixed conifer stands would be reduced from current on-the-ground conditions. The risk of volume loss from mountain pine beetle would be high in lodgepole pine stands. Low levels of wood fibre not used in commercial operations would be available for firewood. Fuelwood would only be provided where scenic quality and wildlife habitat objectives could be met.

Rangelands on the forest would be managed to produce approximately 64,000 animal unit months of forage for consumption by cattle and sheep. Recreational pack and saddle stock are included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

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Wildlife habitat would be managed at a low to moderate intensity. Deer, important big game species, are emphasized on high density winter range (the most important, or key areas) through provision of 30% cover. The Okanogan National Forest currently has no approved plans with specific direction for management of other wildlife species.

Roaded and developed recreation opportunities would be maintained in a natural setting over a major portion of the National Forest. Few areas outside wilderness would be available for unroaded activities. Winter sports would be provided for through 250 miles of snowmobile trail, 75 miles of cross-country ski trail, and the Early Winters and Loup Loup Ski Areas.

The 3,900-acre Early Winters destination ski resort would be developed.

The Loup Loup Ski Area could be upgraded as per an approved site plan.

High to moderate visual quality levels would be maintained over a major portion of the National Forest.

Within the Pasayten and Lake Chelan-Sawtooth Wildernesses, human use and influence would be managed to preserve solitude and natural ecosystems. Structures and improvements would be reviewed and phased out if not essential for protection or administration. Much of the western portion of the Pasayten Wilderness would be managed in a trailless condition, with large areas accessible only by rigorous cross-country travel. The eastern two-thirds of the Pasayten and most of the Lake Chelan-Sawtooth would be managed to provide trail access to most areas, but trail conditions would tend to be more difficult than on trails outside wilderness. No new trailheads would be constructed that would increase visitor use or distribute visitors into areas that currently receive only light use. Grazing of domestic livestock would continue in areas currently grazed and at current stocking levels.

Portions of Liberty Bell, Tiffany, Sawtooth and the Mt. Bonaparte roadless areas would be managed for unroaded recreational opportunities.

The North Cascade Scenic Highway would retain its outstanding scenic qualities, while providing recreation opportunities. Trails would be for horse/hiker only, with no off-road vehicle use permitted. Some trails are closed to horse use. The handicapped-accessible trails at Rainy Lake and Washington Pass would continue to be maintained. No scheduled timber harvest would occur; tree cutting would only be permitted to improve or enhance scenic and recreation opportunities. The majority of wildfires in the area would fall under a confinement fire suppression strategy. The mineral resources would be generally available for development, with consideration given to protecting the scenic values. The existing 13,200 acre mineral withdrawal in the vicinity of Canyon and Ruby Creeks would remain.

Moderate opportunity for roaded minerals exploration would be provided under this alternative.

The Methow and Chewuch Rivers would be recommended for study to determine their suitability for inclusion in the Wild and Scenic River System.

Research Natural Area status would be maintained for the Wolf Creek area.

ALTERNATIVE A AT A GLANCE

Timber Sales	74 million board feet(1)
Even-aged harvest	6,400 acres(1)
Lodgepole pine harvest	300 acres(1)
Selection harvest	240 acres(1)
Precommercial thin	3,300 acres
Roadless Acreage in Year 2000	425,800 acres
Wintering Deer by Year 2000	14,200 animals
Road construction	33 miles(1)
Old-growth Habitat by Year 2000	187,000 acres
Present Net Value	317.1 million dollars

(1) Average annual figures for the decade covered by the plan

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ALTERNATIVE B

The goal of Alternative B is to meet all resource targets assigned to the Okanogan National Forest by the 1980 **Resources Planning Act** (RPA) program in the most cost effective manner. This alternative is required by Pacific Northwest Region planning direction (11/83).

A moderately high level of timber would be harvested in the next decade (about 78 MMBF per year, 15 MMCF per year) under this alternative. As measured in cubic feet, the harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer, lodgepole pine and low productive stands. Approximately 21 MMBF (4.3 MMCF) of lodgepole pine would be included in the annual timber sale program for the next 10 years in order to develop a market for that species, and to forestall losses to mountain pine beetle. Generally, timber management activities would employ cost effective methods. However, to meet the scenic and wildlife objectives in individual areas, the cost of timber management activities may exceed revenue produced.

Harvest unit sizes would be small in wildlife and scenic management areas and large in timber management areas. Mixed conifer stands managed for scenic quality and wildlife habitat would be grown to ages in excess of 140 years; future stands managed for timber production would be 60 to 110 years old when harvested. Insect and disease in mixed conifer stands would be greatly reduced from current conditions. The risk of volume loss from mountain pine beetle would be greatly reduced from current conditions in lodgepole pine stands. Low levels of wood waste would be made available to the public for woodcutting. Fuelwood would only be provided where scenic quality and habitat management objectives could be met.

Rangelands on the forest would be managed to produce approximately 66,600 animal unit months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed at a moderate to high intensity. Deer winter range would be managed for close to optimal snow intercept thermal cover (SIT). This cover consists of multi-storied stands of evergreen trees that intercept the snow, provide protection from the cold and provide forage. At least five percent of the old growth on suitable forest acres would be maintained in each township to provide for geographic distribution of old growth habitat. Current snag and fish habitat levels would be maintained. Other wildlife would not be emphasized, except to ensure viable populations of indicator species (indicator species are selected wildlife species whose population changes are believed to indicate the effect of forest management activities, and are presumed to indicate the welfare of other wildlife that use similar habitats).

Roaded and developed recreation opportunities would be maintained in a natural or slightly altered setting in corridors leading to developed fee sites, and in the North Cascades Scenic Highway area. Corridors leading to non-fee sites would be maintained in an altered setting. A low amount of unroaded area would be maintained as roadless. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

High to moderate visual quality levels would be maintained in corridors leading to developed fee sites and inside designated roadless areas.

The Pasayten and Lake Chelan-Sawtooth Wildernesses would be managed similarly to Alternative A.

All of the Liberty Bell and Pasayten Rim roadless areas and portions of the Sawtooth, Tiffany and the Mt. Bonaparte roadless areas would be managed for unroaded recreational opportunities.

The North Cascades Scenic Highway would be managed similar to Alternative A, except that off-road vehicles would be permitted on designated routes.

Moderate opportunity for roaded minerals exploration would be provided under this alternative.

The Methow and Chewuch Rivers would be recommended for study to determine their suitability for inclusion in the Wild and Scenic River System.

Research Natural Area status would be maintained for the Wolf Creek area, and also accorded to the identified areas at Maple Mountain and Tiffany Mountain.

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ALTERNATIVE B AT A GLANCE

Timber Sales	78 million board feet(1)
Even-aged harvest	7,300 acres(1)
Lodgepole pine harvest	2,400 acres(1)
Selection harvest	480 acres(1)
Precommercial thin	3,300 acres(1)
Roadless Acreage in Year 2000	396,000 acres
Wintering Deer by Year 2000	15,500 animals
Road construction	50 miles(1)
Old-growth Habitat by Year 2000	195,000 acres
Present Net Value	241.9 million dollars

(1) Average annual figures for the decade covered by this plan

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ALTERNATIVE C

The goal of Alternative C is to emphasize the production of non-market resources, including roaded and unroaded recreation, wildlife and fish, water, and areas of high scenic quality. Other resources would be managed at a level to maximize present net value. This alternative is required by current Pacific Northwest Region planning direction.

A low level of timber would be harvested in the next decade (about 53 MMBF per year, 10 MMCF per year) under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer and lodgepole pine. Approximately 12 MMBF (2.4 MMCF) of lodgepole pine would be included in the annual timber sale program. Low productive stands would only contribute a minor amount of volume. Generally, timber would not be harvested where dollar costs exceed benefits produced. Harvest unit sizes would be small. Mixed conifer stands managed for scenic quality and wildlife habitat would be grown to ages in excess of 140 years. Insect and disease in mixed conifer stands would be moderately reduced from current conditions. The risk of volume loss from mountain pine beetle would be slightly reduced from current conditions in lodgepole pine stands. Low levels of wood waste would be made available to the public for woodcutting. Fuelwood would only be provided where scenic quality and habitat management objectives could be met.

Rangelands on the forest would be managed to produce approximately 59,800 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed at a high intensity. Deer winter range would be managed for optimal snow intercept thermal cover. Most old growth on the National Forest would be retained for wildlife habitat. Snag habitat would be increased over current levels. Existing and potential fish habitat would be maintained or enhanced. Riparian areas would be managed as wildlife habitat. Lynx (outside designated roadless areas), mountain goat and bighorn sheep habitat would be managed to benefit these species.

Roaded and developed recreation opportunities would be maintained in a natural or slightly altered setting in non-wildlife areas. A high amount of unroaded area would be maintained as roadless. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

High to moderate visual quality levels would be maintained in non-key wildlife areas and in designated roadless areas.

Trailhead facilities and trail access would be increased to both the Pasayten and Lake Chelan-Sawtooth Wildernesses. Where possible to accomplish without adversely affecting current permit holders, grazing by cattle and sheep would be decreased. No new trails would be constructed in the portions of the Pasayten Wilderness currently considered trailless. Other than those items just mentioned, both wildernesses would be managed as described in Alternative A.

All of the Liberty Bell, Pasayten Rim, Sawtooth, Tiffany Long Draw and Long Swamp roadless areas would be managed for unroaded recreational opportunities and wildlife.

The North Cascades Scenic Highway would be maintained in a natural, primitive setting except for existing developments. No new trails would be constructed; existing trails would be managed to protect the capital investment and for safety. Horses would be allowed only on designated trails. Off-road vehicles would be prohibited within the area. No timber management activities would be allowed. The majority of wildfires in the area would fall under a confinement fire suppression strategy. The Forest Service would recommend withdrawal of all locatable mineral resources from entry under the 1872 Mining Law.

Low opportunity for roaded minerals exploration would be provided under this alternative.

Those eligible rivers which have been suggested for review by the public for inclusion in the Wild and Scenic Rivers System would be recommended for study. Those waters include the Methow, Chewuch, Pasayten, Lost and Twisp Rivers, and Wolf Creek.

Research Natural Areas would be located at Wolf Creek and Maple Mountain.

ALTERNATIVE C AT A GLANCE

Timber Sales	53 million board feet(1)
Even-aged harvest	5,200 acres(1)
Lodgepole pine harvest	1,500 acres(1)
Selection harvest	0 acres(1)
Precommercial thin	2,800 acres(1)
Roadless Acreage in Year 2000	453,500 acres
Wintering Deer by Year 2000	16,500 animals
Road construction	34 miles(1)
Old-growth Habitat by Year 2000	204,000 acres
Present Net Value	305.8 million dollars

(1) Average annual figures for the decade covered by the plan.

ALTERNATIVE D

The goal of Alternative D is to emphasize those management practices and activities which increase revenues to the Federal Government. Revenue producing activities are primarily timber harvest, range use by domestic livestock, use of developed recreation sites where fees are charged, and issuance of special use permits for recreation activities such as at Loup Loup Ski Area and Early Winters. Other resources would be managed at a level that maximize present net value. This alternative is required by current Pacific Northwest Region planning direction.

A high level of timber would be harvested in the next decade (about 94 MMBF per year, 18 MMCF per year) under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the next decade. Timber management activities would occur in mixed conifer, lodgepole pine and low productive stands. Approximately 22 MMBF (4.6 MMCF) of lodgepole pine would be included in the annual timber sale program to develop a market the species, and to forestall losses to mountain pine beetle. Generally, timber management activities would employ cost effective methods.

Harvest unit sizes would be large; mixed conifer stands would generally be 60 to 110 years old when harvested. Insect and disease in mixed conifer stands would be greatly reduced from current conditions. The risk of volume loss from mountain pine beetle would be greatly reduced from current conditions in lodgepole pine stands. High levels of wood waste would be made available to the public for woodcutting.

Rangelands on the forest would be managed to produce approximately 75,900 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed to meet minimum management requirements only to ensure viable populations of indicator species.

Roaded and developed recreation opportunities would be maintained in a natural or slightly altered setting in corridors leading to developed fee sites and in the North Cascades Scenic Highway area. No unroaded recreation opportunities would be provided. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

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High to moderate visual quality levels would be maintained in corridors leading to developed fee sites, and in the North Cascades Scenic Highway area.

The Pasayten and Lake-Chelan Sawtooth Wildernesses would be managed similarly to Alternative A.

All roadless areas would be available for timber harvest, minerals or other activities.

The existing scenic values within the North Cascades Scenic Highway would be maintained. A trail system would be developed to serve a full range of users, including ORV to horse/hiker. Timber harvest would be allowed so long as it met visual quality objectives. The primary wildfire suppression strategies in the area would be containment and control. Minerals would be generally available for development with consideration for scenic values. The withdrawal from mineral operation at Canyon and Ruby Creeks would be eliminated, making that area available.

High opportunity for roaded minerals exploration would be provided under this alternative. The number of administrative withdrawals would be reduced.

No rivers would be recommended for study for inclusion in the Wild and Scenic Rivers System.

The existing Research Natural Area at Wolf Creek would be maintained.

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ALTERNATIVE D AT A GLANCE

Timber Sales	94 million board feet(1)
Even-aged harvest	9,400 acres(1)
Lodgepole pine harvest	2,500 acres(1)
Selection harvest	480 acres(1)
Precommercial thin	3,600 acres(1)
Roadless Acreage in Year 2000	377,000 acres
Wintering Deer by Year 2000	10,100 animals
Road construction	57 miles(1)
Old-growth Habitat by Year 2000	191,000 acres
Present Net Value	260.6 million dollars

(1) Average annual figures for the decade covered by the plan.

ALTERNATIVE E

The goal of Alternative E is to retain the current roadless areas to meet benefits for scenery, unroaded recreation, wildlife and other non-market resources. Intensive timber management would be practiced on roaded lands in order to maintain a moderate level of harvest. The objective is to maximize the production of timber from roaded areas, while providing other resources at levels which maximize present net value. This alternative is required by Pacific Northwest Region planning direction.

A low level of timber would be harvested in the next decade (about 59 MMBF per year, 11 MMCF per year) under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer and lodgepole pine stands. Approximately 6 MMBF (1.2 MMCF) of lodgepole pine would be included in the annual timber sale program. Low productive stands would only contribute a minor amount of volume. Generally, timber management activities would employ cost effective methods. Harvest unit sizes would be large; mixed conifer stands would 60 to 110 years old when harvested. Insect and disease in mixed conifer stands would be moderately reduced from current conditions. The risk of volume loss from mountain pine beetle would be slightly reduced from current conditions in lodgepole pine stands. Low levels of wood waste would be made available to the public for woodcutting.

Rangelands on the forest would be managed to produce approximately 61,500 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Existing wildlife habitat would be retained in designated roadless areas. Wildlife habitat outside designated roadless areas would be managed at a low density (only to ensure viable populations of indicator species).

Roaded and developed recreation would be maintained in an altered setting over the entire forest, except in the North Cascades Scenic Highway area where recreation opportunities would be managed in a natural setting. All roadless areas would be maintained as roadless. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

High to moderate visual quality levels would be maintained in the North Cascades Scenic Highway area and in roadless areas.

The Pasayten and Lake-Chelan Sawtooth Wildernesses would be managed similar to Alternative A.

All roadless areas would be managed for unroaded recreational opportunities and wildlife habitat.

The North Cascades Highway would be managed similar to Alternative C.

Moderate opportunity for roaded minerals exploration would be provided under this alternative.

The Methow and Chewuch Rivers would be recommended for study to determine their suitability for inclusion in the Wild and Scenic River System.

Research Natural Area status would be maintained for the Wolf Creek area.

ALTERNATIVE E AT A GLANCE

Timber Sales	59 million board feet(1)
Even-aged harvest	4,900 acres(1)
Lodgepole pine harvest	700 acres(1)
Selection harvest	240 acres(1)
Precommercial thin	2,300 acres(1)
Roadless Acreage in Year 2000	481,400 acres
Wintering Deer by Year 2000	10,500 animals
Road construction	22 miles(1)
Old-growth Habitat by Year 2000	194,000 acres
Present Net Value	249.1 million dollars

(1) Average annual figures for the decade covered by the plan.

ALTERNATIVE F

The goal of Alternative F is to emphasize the production of timber at minimum costs, while providing optimal management of mule deer habitat in the Methow Valley. Other resources would be provided at levels which maximize present net value.

A moderate level of timber would be harvested (about 78 MMBF per year, 15 MMCF per year) in the next 10 years under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer, lodgepole pine and low productive stands. Approximately 21 MMBF (4.2 MMCF) of lodgepole pine would be included in the annual timber sale program to develop a market the species, and to forestall losses to mountain pine beetle. Generally, timber management activities would employ cost effective methods. Harvest unit sizes would be large, except in areas managed for big game habitat, where unit sizes would be moderate to small. Mixed conifer stands in timber management areas would be generally be grown to age 60 to 110 years, except in big game habitat areas where ages would be in excess of 140 years. Insect and disease in mixed conifer stands would be greatly reduced from current conditions. The risk of volume loss from mountain pine beetle would be greatly reduced from current conditions in lodgepole pine stands. Low levels of fuelwood would be made available to the public for woodcutting. Wildlife habitat management areas would only provide fuelwood where wildlife habitat objectives would be met.

Rangelands on the forest would be managed to produce approximately 63,300 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed at a moderate intensity in the Methow Valley and at a low intensity elsewhere. Deer winter range would be managed for optimal snow intercept thermal cover in the Methow Valley, and for minimum viable populations elsewhere. At least 5 percent of the old growth on suitable forest acres would be maintained in each township to provide for geographic distribution of old growth habitat. Snag habitat would be increased over current levels in deer winter range areas and decreased (managed for minimum viable populations) elsewhere. Existing and potential fish habitat would be maintained or enhanced. Other wildlife habitat would not be emphasized, except to ensure viable populations of indicator species.

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Roaded and developed recreation opportunities would be maintained in an altered setting, except in the North Cascades Scenic Highway area, where recreation opportunities would be maintained in a natural setting. A moderate amount of unroaded area would be maintained as roadless. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A. Cross-country skiing and snowmobiling would be restricted in deer winter range in the Methow Valley to decrease animal harassment.

High to moderate visual quality levels would be maintained in the North Cascades Scenic Highway area and in roadless areas.

The Pasayten and Lake-Chelan Sawtooth Wildernesses would be managed similar to Alternative A.

The Liberty Bell, Pasayten Rim, Granite Mountain, Tiffany and portions of the Sawtooth roadless areas would be managed for unroaded recreational opportunities. These areas generally represent unsuitable timber acres, or areas with high operating costs for timber management.

The North Cascades Scenic Highway would be managed as described in Alternative A.

Moderate opportunity for roaded minerals exploration would be provided under this alternative.

Those rivers identified in the Washington Statewide Outdoor Recreation Plan of 1978, the Methow, Twisp and Chewuch, would be recommended for study for their suitability for inclusion in the Wild and Scenic River System.

The existing Research Natural Area at Wolf Creek would be maintained.

ALTERNATIVE F AT A GLANCE

Timber Sales	78 million board feet(1)
Even-aged harvest	8,200 acres(1)
Lodgepole pine harvest	2,300 acres(1)
Selection harvest	360 acres(1)
Precommercial thin	3,100 acres(1)
Roadless Acreage in Year 2000	409,000 acres
Wintering Deer by Year 2000	12,700 animals
Road construction	46 miles(1)
Old-growth Habitat by Year 2000	198,000 acres
Present Net Value	258.0 million dollars

(1) Average annual figures for the decade covered by the plan.

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ALTERNATIVE G

The goal of Alternative G is to emphasize quality wildlife habitat and high scenic values in key areas. Other resources would be managed at levels to maximize present net value.

A low level of timber would be harvested in the next decade (about 64 MMBF per year, 12 MMCF per year) under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer, lodgepole pine and low productive stands. Approximately 18 MMBF (3.6 MMCF) of lodgepole pine would be included in the annual timber sale program to develop a market the species, and to forestall losses to mountain pine beetle. Generally, timber would not be harvested where costs exceed revenues produced. Harvest unit sizes would vary from small to large depending upon the objective of the management area. Mixed conifer stands managed for scenic quality and wildlife habitat would be grown to ages in excess of 140 years; stands managed for timber production would be 60 to 110 years old when harvested. Insect and disease in mixed conifer stands would be moderately reduced from current conditions. The risk of volume loss from mountain pine beetle would be greatly reduced from current conditions in lodgepole pine stands. Moderate levels of wood waste would be made available to the public for woodcutting. Fuelwood would only be provided where scenic quality and wildlife habitat management objectives could be met.

Rangelands on the forest would be managed to produce approximately 64,200 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed at a high intensity. Deer winter range would be managed for close to optimal snow intercept thermal cover. At least five percent of the old growth on suitable forest acres would be maintained in each township to provide for geographic distribution of old growth habitat. Snag habitat would be maintained or enhanced over current levels. Existing and potential fish habitat would be maintained or enhanced. Riparian areas would be managed as wildlife habitat, except in Management Area 5. Lynx, mountain goat and bighorn sheep habitat would be managed to benefit these species.

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Roaded and developed recreation opportunities would be maintained in a natural or slightly altered setting in corridors leading to developed fee sites and in the North Cascades Scenic Highway area. A moderate amount of area would be maintained as roadless. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A. Cross-country skiing and snowmobiling would be restricted in deer winter range areas to decrease animal harassment.

High to moderate visual quality levels would be maintained along major travel corridors and in roadless areas.

The Pasayten and Lake-Chelan Sawtooth Wildernesses would be managed similarly to Alternative A.

Portions of Liberty Bell, Sawtooth, Tiffany and Mt. Bonaparte roadless ares would be managed for unroaded recreational opportunities and wildlife habitat.

The North Cascades Scenic Highway would be managed as described in Alternative A, except that off-road vehicles would be permitted on designated routes.

Moderate-high opportunity for roaded minerals exploration would be provided under this alternative.

The Methow River would be recommended for study to determine its suitability for inclusion in the Wild and Scenic River System.

Research Natural Area status would be maintained for the Wolf Creek area, and new RNAs would be established at Tiffany Mountain and Maple Mountain.

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ALTERNATIVE G AT A GLANCE

Timber Sales	64 million board feet(1)
Even-aged harvest	6,100 acres(1)
Lodgepole pine harvest	2,200 acres(1)
Selection harvest	0 acres(1)
Precommercial thin	3,200 acres(1)
Roadless Acreage in Year 2000	427,100 acres
Wintering Deer by Year 2000	15,500 animals
Road construction	43 miles(1)
Old-growth Habitat by Year 2000	198,000 acres
Present Net Value	282.5 million dollars

(1) Average annual figures for the decade covered by the plan.

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(Departure)

ALTERNATIVE G (DEPARTURE)

The goal, objectives and other features of this alternative are nearly identical to Alternative G except that a moderate level of timber (about 80 MMBF per year, 16 MMCF per year) would be provided in the next decade. This alternative would depart from non-declining even-flow during the first decade (for the next 10 years the harvest level is raised above that which could be sustained at a constant or increasing amount). This would phase in a reduced harvest level to enable the local industry to adjust capacities. See Chapter III for a discussion of the current harvest level. Approximately 18 MMBF (3.6 MMCF) of lodgepole pine would be included in the annual timber sale program for the next two decades in order to develop a market for that species, and to forestall losses to mountain pine beetle. This alternative meets Pacific Northwest Region planning direction to formulate a departure alternative.

ALTERNATIVE G (Departure) AT A GLANCE

Timber Sales	80 million board feet(1)
Even-aged harvest	7,400 acres(1)
Lodgepole pine harvest	2,200 acres(1)
Selection harvest	0 acres(1)
Precommercial thin	3,200 acres(1)
Roadless Acreage in Year 2000	424,100 acres
Wintering Deer by Year 2000	15,500 animals
Road construction	44 miles(1)
Old-growth Habitat by Year 2000	198,000 acres
Present Net Value	287.1 million dollars

(1) Average annual figures for the decade covered by the plan.

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ALTERNATIVE H

The goal of Alternative H is to produce moderate levels of timber while simultaneously providing large amounts of high quality wildlife habitat. The objective is to maximize timber outputs while managing other resources at levels which maximize present net value.

A moderate level of timber would be harvested in the next decade (about 69 MMBF per year, 13 MMCF per year) under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer, lodgepole pine and low productive stands. Approximately 21 MMBF (4.3 MMCF) of lodgepole pine would be included in the annual timber sale program to develop a market the species, and to forestall losses to mountain pine beetle. Generally, timber management activities would employ cost effective methods. However, to meet the wildlife objectives of individual management areas, the dollar cost of timber management activities may exceed revenue produced. Harvest unit sizes would be moderate to large. Mixed conifer stands would generally be grown to ages in excess of 140 years. Insects and disease in mixed conifer stands would be moderately reduced from current conditions. The risk of volume loss from mountain pine beetle would be greatly reduced from current conditions in lodgepole pine stands. Low levels of wood waste would be made available to the public for woodcutting. Fuelwood would only be provided where wildlife habitat management objectives could be met.

Rangelands on the forest would be managed to produce approximately 67,700 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

Wildlife habitat would be managed at a high intensity. Deer winter range would be managed for optimal snow intercept thermal cover. Most of the old growth on the National Forest would be retained for wildlife habitat. Snag habitat would be increased over current levels. Existing and potential fish habitat would be maintained or enhanced. Riparian areas would be managed as wildlife habitat. Lynx, mountain goat and bighorn sheep habitat would be managed to benefit these species.

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Roaded and developed recreation opportunities would be provided in an altered setting, except in the North Cascades Scenic Highway area where they would provided in a natural setting. The only unroaded recreation opportunities provided would be in the North Cascades Scenic Highway area. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

High to moderate visual quality levels would be maintained in the North Cascades Scenic Highway area.

The Pasayten and Lake-Chelan Sawtooth Wildernesses would be managed similar to Alternative A.

Only those portions of the Liberty Bell and Sawtooth roadless areas within the North Cascades Scenic Highway area would be managed for unroaded recreational opportunities.

Moderate-high opportunity for roaded minerals exploration would be provided under this alternative.

The Methow, Chewuch, Twisp and Lost Rivers would be recommended for study to determine their suitability for inclusion in the Wild and Scenic Rivers System.

The Research Natural Area at Wolf Creek would be maintained, and new RNAs established at Tiffany Mountain and Maple Mountain.

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ALTERNATIVE H AT A GLANCE

Timber Sales	69 million board feet(1)
Even-aged harvest	6,500 acres(1)
Lodgepole pine harvest	2,600 acres(1)
Selection harvest	0 acres(1)
Precommercial thin	3,500 acres(1)
Roadless Acreage in Year 2000	417,900 acres
Wintering Deer by Year 2000	14,600 animals
Road construction	46 miles(1)
Old-growth Habitat by Year 2000	199,000 acres
Present Net Value	277.7 million dollars

(1) Average annual figures for the decade covered by the plan.

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ALTERNATIVE I

This alternative was presented to the Okanogan National Forest by a coalition of individuals from various environmental organizations. The goals of this alternative are to retain most of the roadless areas so they could be considered for future classification as wilderness, to manage key wildlife habitat for wildlife benefit, and manage areas adjacent to major travel routes for their scenic qualities. The objective of the alternative is to manage other resources at levels to maximize present net value.

A very low level of timber would be harvested (about 42 MMBF, 8 MMCF) in the next decade under this alternative. The cubic foot harvest level in future decades would be equal to or greater than that of the first decade. Timber management activities would occur in mixed conifer and lodgepole pine stands. Approximately 5 MMBF (1.0 MMCF) of lodgepole pine would be included in the annual timber sale program. Low productive stands would not normally be permitted. Timber would not be harvested where costs exceed revenue produced. Preference for harvesting would be for methods other than clearcutting. Harvest unit sizes would be small. Mixed conifer stands would generally be grown to ages in excess of 140 years. Insect and disease in mixed conifer stands would be slightly reduced from current conditions. The risk of volume loss from mountain pine beetle would be slightly reduced from current conditions in lodgepole pine stands. Low levels of fuelwood would be made available to the public for woodcutting. Fuelwood would only be provided where scenic quality and wildlife habitat management objectives could be met.

Rangelands on the forest would be managed to produce approximately 57,400 Animal Unit Months of forage for consumption by cattle and sheep. Recreational pack and saddle stock is included within this amount. Range improvements would be provided in accordance with the requirements of each management area.

The amount of forage consumed by cattle and sheep would be reduced in order to improve the condition of riparian zones, reduce or eliminate conflicts with wildlife, and to attain improved scenic value of meadows which are important for recreation purposes. Grazing would be allowed only where allotment receipts exceed the cost of management by the Forest Service.

Wildlife habitat would be managed at a moderate intensity. Deer winter range would be managed for close to optimal snow intercept thermal cover. All of the old growth on the National Forest would be retained for wildlife habitat. Snag habitat would be increased over current levels. Existing and potential fish habitat would be maintained or enhanced. Riparian areas would be managed as wildlife habitat.

Roaded recreation opportunities would be maintained in a natural setting in the foreground along major roads. Several areas would be managed only for scenic values, with timber management activities prohibited. Downhill ski opportunities would be provided by the Early Winters and Loup Loup Ski Areas. These alpine ski areas would be managed the same as under Alternative A.

The Pasayten and Lake Chelan-Sawtooth Wildernesses would be managed as described in Alternative A, except grazing by cattle and sheep would be decreased where possible to accomplish without adversely affecting current permit holders.

All roadless areas except Mt. Bodie and South Ridge would be managed for unroaded recreational opportunities, wildlife, aesthetics and for possible future designation as wilderness.

The North Cascades Highway would be managed the same as under Alternative C.

Low opportunity for roaded minerals exploration would be provided under this alternative. Withdrawals from mineral entry would be recommended for areas of high environmental sensitivity.

The Methow, Chewuch, Twisp, Lost and Pasayten Rivers and Wolf Creek would be recommended for study to determine their suitability for inclusion in the Wild and Scenic Rivers System.

The Wolf Creek Research Natural Area will be retained and Research Natural Areas would be established at Maple Mountain and Tiffany Mountain.

A botanical area would be established in the vicinity of Hart's Pass.

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ALTERNATIVE I AT A GLANCE

Timber Sales	42 million board feet(1)
Even-aged harvest	4,000 acres(1)
Lodgepole pine harvest	700 acres(1)
Selection harvest	0 acres(1)
Precommercial thin	2,400 acres(1)
Roadless Acreage in Year 2000	481,400 acres
Wintering Deer by Year 2000	16,500 animals
Road construction	19 miles(1)
Old-growth Habitat by Year 2000	204,000 acres
Present Net Value	264.8 million dollars

(1) Average annual figures for the decade covered by the plan.

SUMMARY OF MAJOR DISTURBING ACTIVITIES

Two of the major activities of each alternative and of major interest to most people are the timber offered for sale and amount of roading. Accordingly, graphs follow which demonstrate the amount of area proposed for regeneration by even-aged methods (Figure II-1), for selection harvest of low productivity lands (Figure II-2), and for precommercial thinning (Figure II-3). Also displayed are the projected Allowable Sale Quantities over 16 decades for all alternatives (Figure II-4). The amount of roadless area that would be roaded over the next 50 years are shown in Figure II-5. Table II-8 located towards the end of the chapter displays the amount of suitable land available for timber production in each alternative. It will be useful in interpreting several of the figures described below.

Figure II-1 (even-aged regeneration) shows that Alternatives D and F would regenerate the most acres. Alternatives D and A would result in the greatest number of acres of mixed conifer stands regenerated during the next five decades. Alternative D, followed by Alternative C would regenerate the most lodgepole pine stands. Alternative I followed by Alternative C would result in the fewest mixed conifer acres regenerated. Alternative A followed by Alternative I would result in the fewest acres of lodgepole pine regenerated over time.

Figure II-2 (uneven-age harvest) indicates that Alternatives B and D would harvest the largest number of acres by selection cutting during the next 5 decades. These alternatives would harvest approximately 24 thousand acres during the next 50 years. Alternative I would have the fewest number of acres using selection cutting, because no logging would be done in low productive stands.

Figure II-3 (precommercial thinning) shows that during the next 50 years, the greatest amount of precommercial thinning would occur in Alternative D, followed by Alternatives F and H. During the next 10 years, Alternative D would thin about 37 thousand acres. Alternative I would precommercial thin the fewest number of acres over the next 50 years. During the next 10 years, Alternative I would precommercially thin about 24 thousand acres. Increases in timber volume growth in later decades would be proportional to the numbers of acres precommercially thinned between alternatives.

Figure II-4 displays the Allowable Sale Quantity for each of the alternatives. Alternatives A (Current Direction) and G (Departure) would depart from non-declining even-flow. Initial harvest levels (during the 10 years covered by this planning effort) would be higher than could be sustained given the forest goals and management prescriptions in the respective alternatives, and existing timber inventory and growth potentials. Alternative D would provide both the highest first decade harvest level, and the highest Long-Term Sustained Yield Capacity of any alternative. The lowest harvest level during the next ten years, and over the long-term would be provided by Alternative I.

FIGURE II - 1 Total Acres Regenerated Using Even-Aged Management During the Next Five Decades. Acres shown include areas regenerated by timber sales and non-stocked, poorly growing stands.

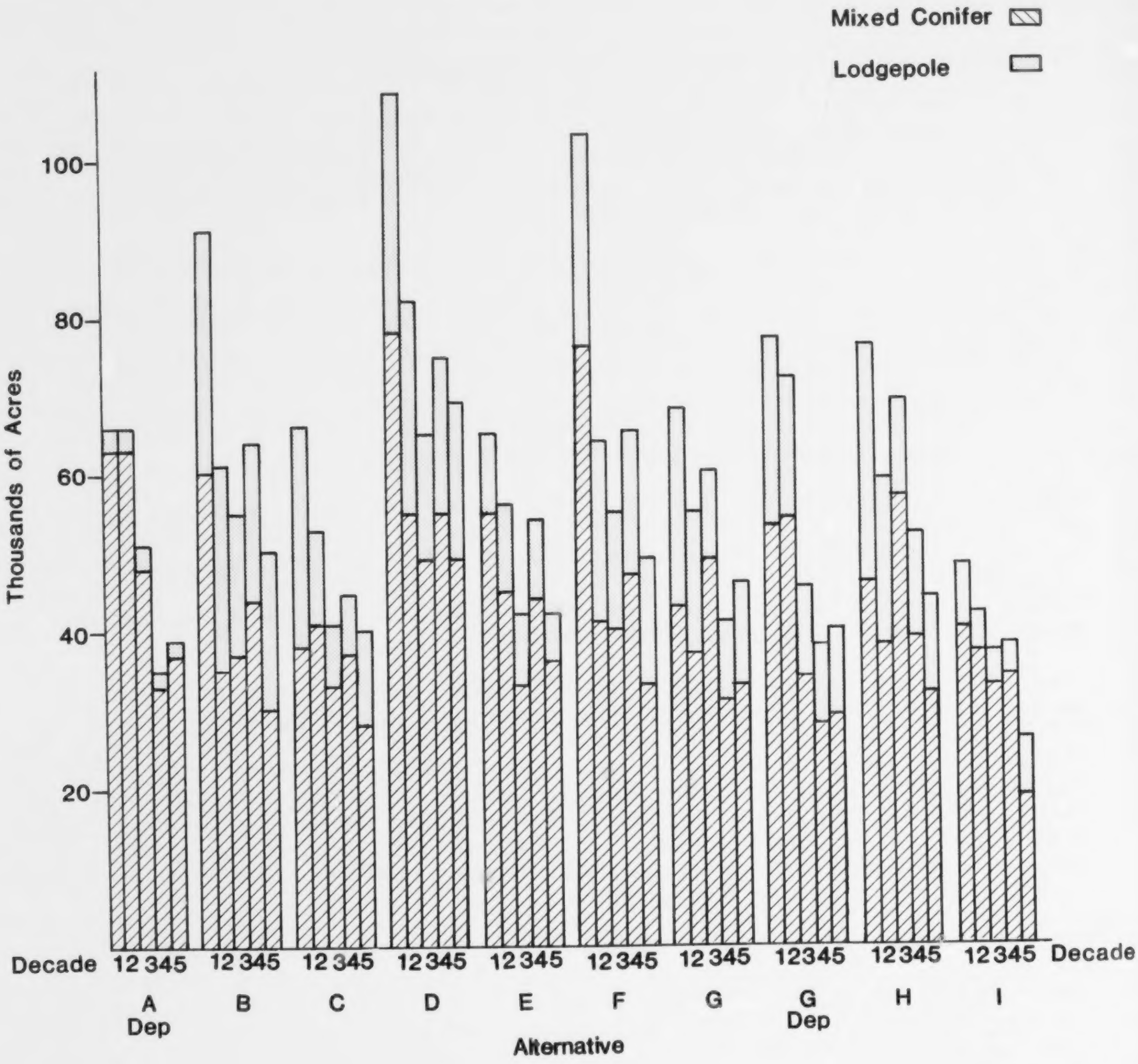


FIGURE II - 2 Acres of Selection Harvest (Low Production) During the Next Five Deacades.

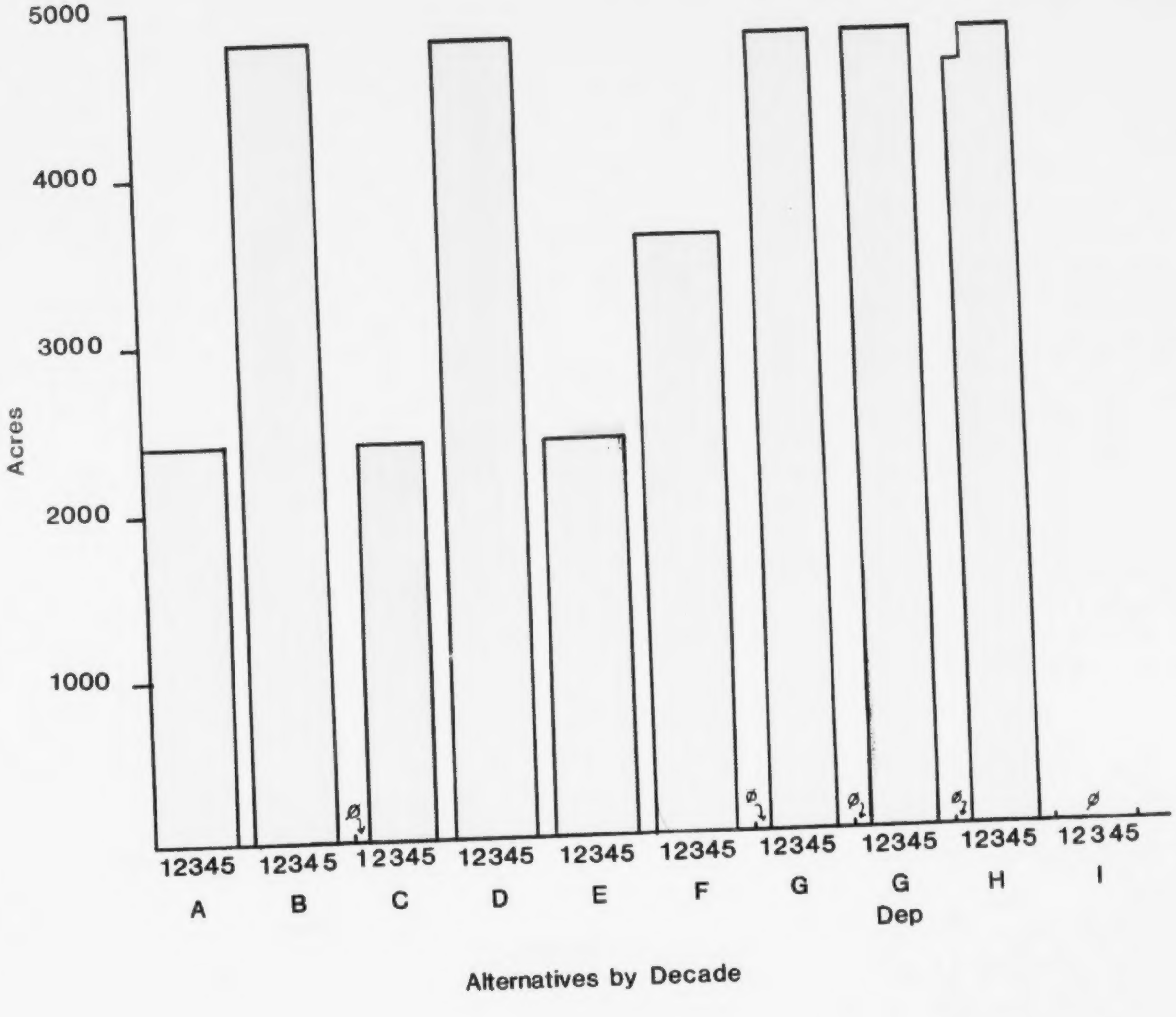


FIGURE II - 3 Acres Precommercially Thinned for Each of the First Five Decades

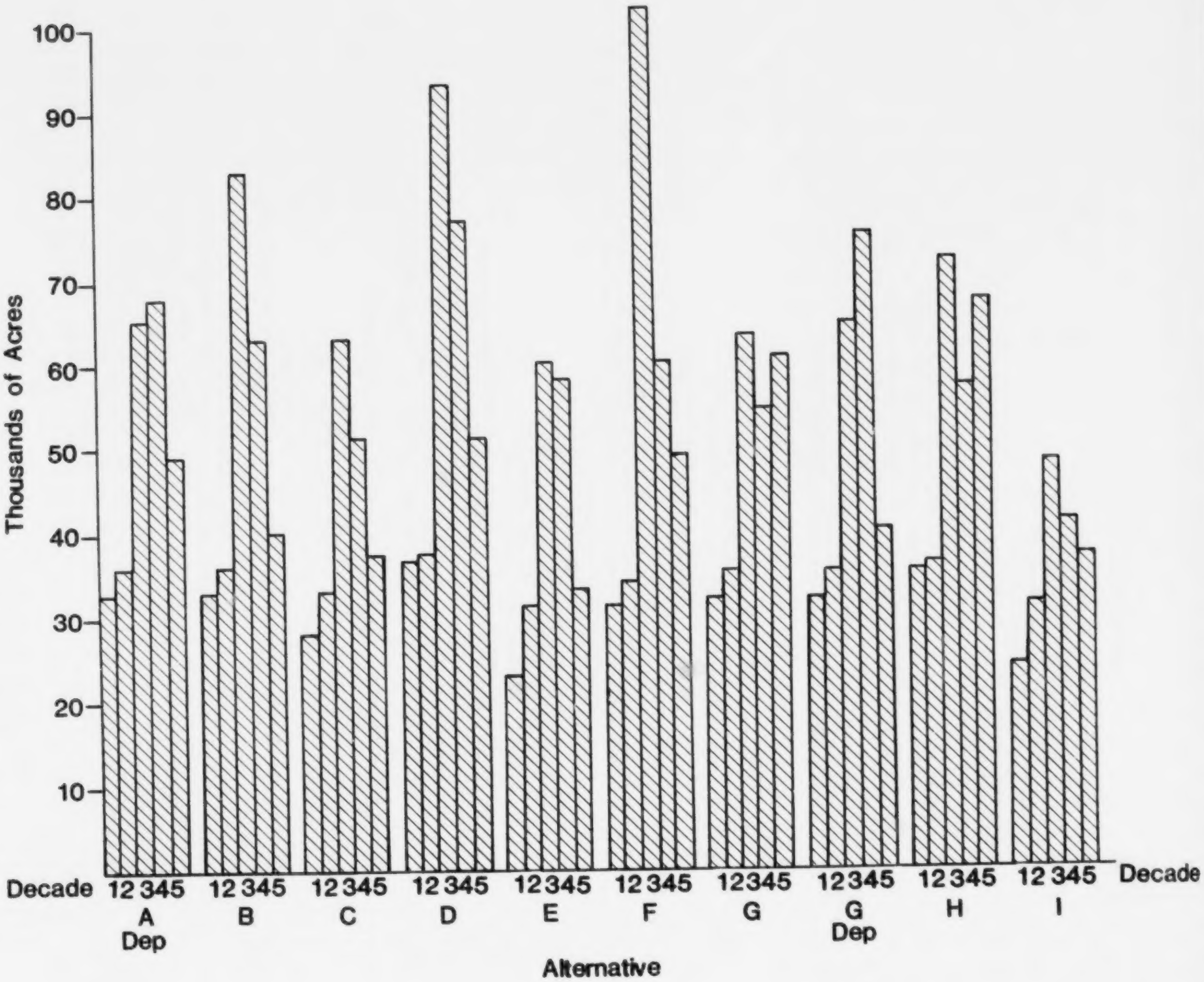
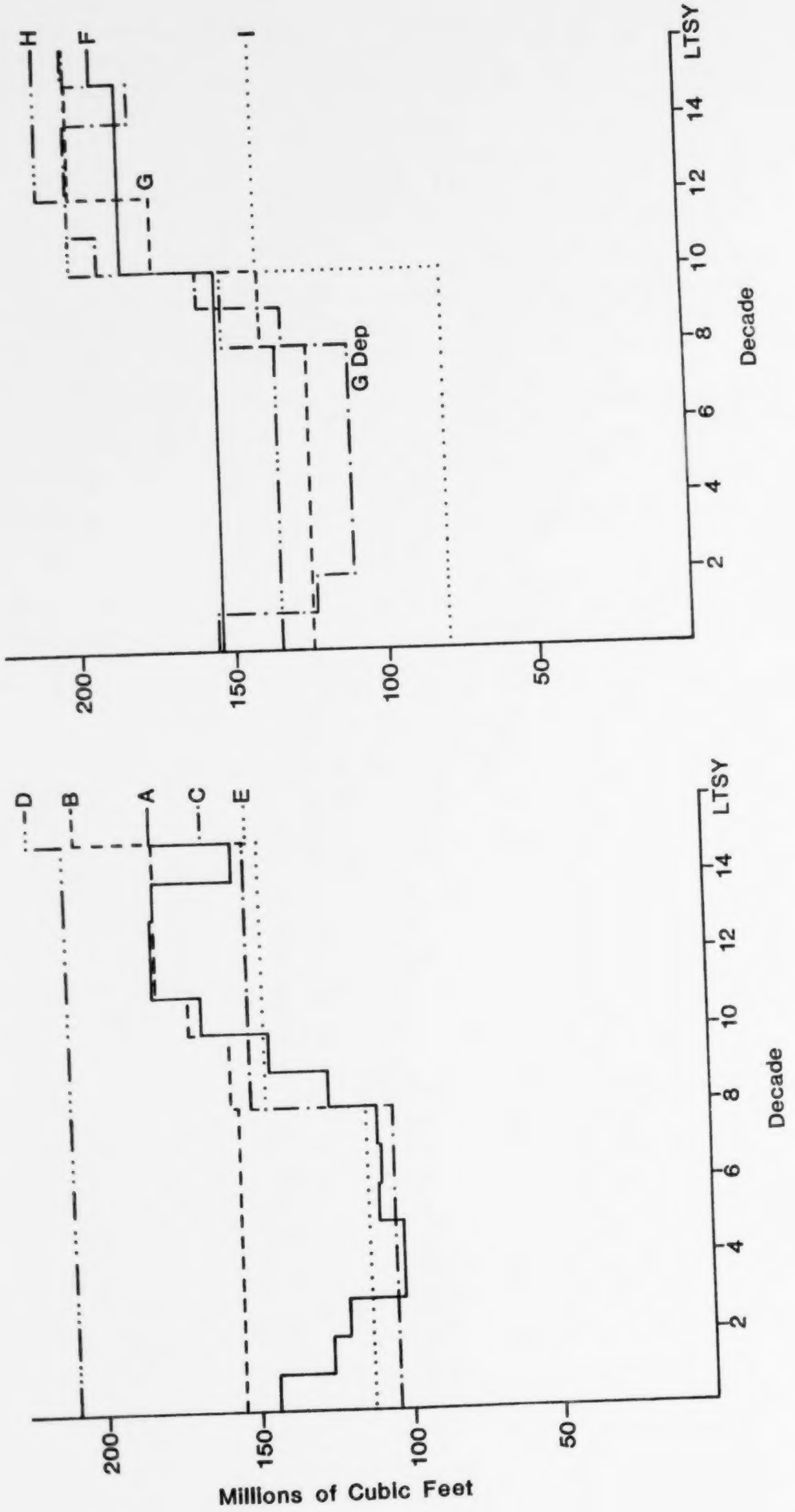


FIGURE II - 4 Allowable Sale Quantity for Each of the Alternatives Over Time.

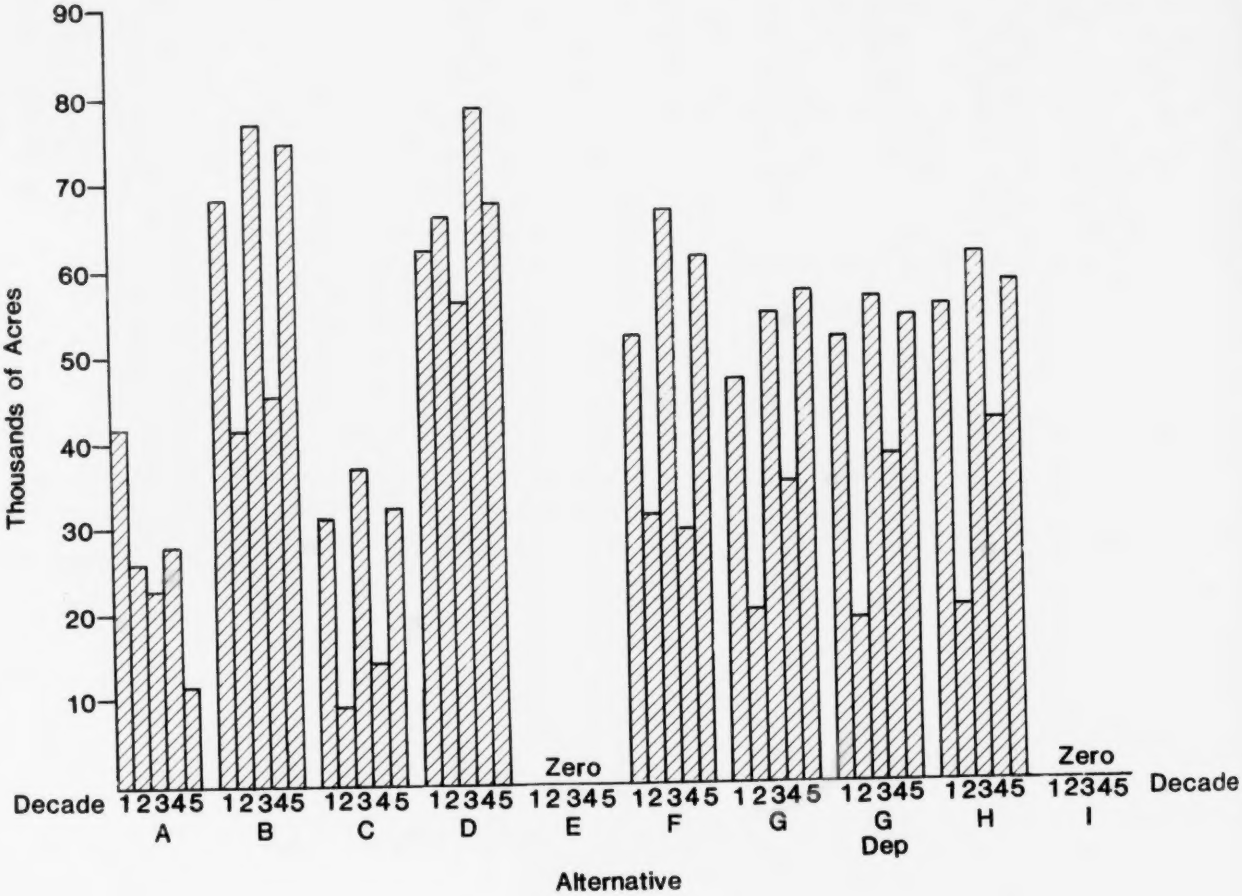


ROADS

All alternatives would require increasing the local road mileage above the existing inventory in both the short and long-term, thereby accessing more acres. None of the alternatives would require increasing arterial and collector road mileage above the existing inventory. However, all alternatives would require some arterial and collector reconstruction to upgrade access into areas with little previous timber harvest or to accommodate concurrent use by recreation traffic and commercial haul. Arterial and collector reconstruction by itself would not change the acres of National Forest accessed.

Table II-1 displays the miles of road constructed and reconstructed each year in each of the alternatives. Many people are very interested in the amount of acres that will be accessed by road within existing roadless areas. Figure II-5 below displays this information.

FIGURE II-5 Acres accessed by road by decade within areas currently in a roadless condition.



Roads have effects on other resources. Any increase in road mileage or acres accessed will have corresponding effects on:

- soil; accelerated erosion
- water; increased turbidity
- wildlife habitat; degradation or destruction
- wildlife; displacement
- timber; loss of acres but increased management
- range; animal harassment, loss of acres, introduction of noxious weeds, but increased ease of administration
- recreation; roads change the character of recreation such as from semi-primitive motorized to rural

The effects of road construction on these resources is discussed under the corresponding resource section.

MITIGATION MEASURES

Many measures to mitigate adverse environmental consequences have been incorporated into the alternatives. These mitigation measures include:

(a) Avoiding the impact altogether by not taking a certain action or parts of an action;

(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation;

(c) Rectifying the impact by repairing, rehabilitating or restoring the affected environment;

(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action;

(e) Compensating for the impact by replacing or prodiving substitute resources or environments.

The mitigation measures are stated in the Forest Plan as "Standards and Guidelines." All these standards and guidelines reduce what could otherwise be adverse impacts and all are of proven effectiveness, based on previous experience. The frequencies of using these measures are spelled out in the Forest Plan.

Two approaches to implementing mitigation are site specific environmental evaluations and monitoring. Implementation of projects involves site specific analysis to determine how to implement this plan. The decision process follows these steps:

> The Regional Guide spells out "how to plan" guidance and sets standards in certain activities.
>
> The Forest Plan sets resource objectives for areas of the forest and for the whole forest; it also establishes when certain activities are likely to take place.

Site specific analyses of proposed projects establish "how to do it" standards for specific sites.

Monitoring identifies any needs for changes in how the standards and guidelines are to be implemented and can, if the effects are serious enough, lead to a plan amendment or revision.

COMPARISON OF ALTERNATIVES

This section will present the alternatives in a way that they can be easily compared. The aspects of the alternatives that will be presented for comparison include: responsiveness to issues and concerns, management areas, resource outputs, environmental effects, and costs and benefits. In addition to tables presenting information, narrative sections describe differences between the alternatives.

The purpose of forest planning is to identify and select for implementation the alternative that most nearly maximizes net public benefits. Net public benefits are defined as the "...overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not...consistent with the principles of multiple-use and sustained yield" (36 CFR 219.3).

No mathematical formula is available to define the preferred alternative. Indeed, differences of opinion are expressed about whether particular effects of alternatives are positive or negative. Therefore, it is necessary to separately identify all the major effects of each alternative as the basis for review, judgment and an eventual selection.

The following pages summarize the outputs, effects and conditions (in tables and narrative) that differ significantly among alternatives.

Tabular displays include:

Table II-1	Response to Issues, Concerns and Opportunities by Alternative
Table II-2	Management Areas by Alternative
Table II-3a	Quantifiable Resource Outputs and Environmental Effects by Alternative
Table II-3b	Qualitative Resource Outputs and Environmental Effects by Alternative
Table II-4	Present Net Value and Discounted Costs and Benefits of Alternatives
Table II-5	Present Net Value and Discounted Benefits and Costs by Resource Group by Alternative
Table II-6	Average Annual Cash Flows and Noncash Benefits in the First and Fifth Decades by Alternative
Table II-7	Quantitative Indicators of Responsiveness of Alternatives to Major Issues and National Concerns
Table II-8	Acres of National Forest Land Capable, Available and Suitable for Timber Production.

RESPONSE TO ISSUES AND CONCERNS

Alternatives are different ways of responding to issues and concerns. Table II-1 presents the ways that each alternative responds to each of the issues and concerns. The comparisons made in Table II-1 are to "Current Direction" (Alternative A), in contrast to the existing conditions. The exception to this is the RPA issue, which compares each alternative to the established RPA targets. Chapter IV describes effects by noting changes from existing conditions. Because benchmarks are analytic bases, rather than attempts to respond to all issues, they do not appear in this table.

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E
Winter Recreation Opportunities	3,900-acre alpine ski facility authorized at Early Winters	No change	No change	No change	No change
	Upgrading of facilities authorized at Loup Loup Ski Area	No change	No change	No change	No change
	Few winter logging conflicts and route restrictions	High increase in winter logging conflicts and route restrictions	Decrease in winter logging conflicts and route restrictions	High increase in winter logging conflicts and route restrictions	High increase in winter logging conflicts and route restrictions
	Few conflicts between snowmobilers and cross-country skiers expected	Potential increase in conflicts between snowmobilers and cross-country skiers	Same as B	Decrease in expected conflicts between snowmobilers and cross-country skiers	Same as B

F	G	G Departure	H	I
No change	No change	No change	No change	No change
No change	No change	No change	No change	No change
High increase in winter logging conflicts and route restrictions	Moderate increase in winter logging conflicts and route restrictions	Moderate increase in winter logging conflicts and route restrictions	High increase in winter logging conflicts and route restrictions	Moderate increase in winter logging conflicts and route restrictions
Same as B	Same as B	Same as B	Same as D	Same as D

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Provide for Off-Road Vehicle Use While Maintaining Other Recreation Opportunities	30,000 acres would provide unroaded trailbike opportunities 1/	13% decrease	143% increase	100% increase	220% increase

F	G	G Departure	H	I
90% increase	37% increase	37% increase	100% increase	100% increase

1/ Refer to Road Management issue for ORV opportunities in a roaded setting

	A	B	C	D	E
Variety of Recreation Opportunities	149,000 acres would provide unroaded recreation opportunities	13% increase	14% increase	100% decrease	223% increase
	438,000 acres would provide roaded recreation opportunities in a natural setting	78% decrease	44% decrease	63% decrease	95% decrease
	493,000 acres would provide roaded recreation opportunities in a modified setting	65% increase	5% decrease	86% increase	17% increase
	70 developed sites in a natural setting	31% decrease	No change	37% decrease	79% decrease

F	G	G Depart	H	I
91% increase	38% increase	38% decrease	57% increase	218% increase
95% decrease	59% decrease	59% decrease	95% decrease	68% decrease
56% increase	41% increase	41% increase	101% increase	5% decrease
89% decrease	9% decrease	9% decrease	89% increase	26% decrease

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Protection of Historical Sites	Federal law requires the mitigation of adverse impacts to eligible (significant) historical or cultural resources which would result from any federal action. Consultation is required with the Advisory Council on Historic Preservation or the State Historic Preservation Office prior to undertaking a federal action that may impact significant cultural resources. All alternatives would continue cultural resource inventories. All located cultural resources would be evaluated to determine eligibility for inclusion to the National Register of Historic Places.				

	F	G	G Depart	H	I
	Same as Alternatives A through E				

	A Current Direction	B RPA	C	D	E
Emphasis on Scenery	587,000 acres of non-wilderness lands in a natural appearing or slightly altered condition	55% decrease	4% increase	72% decrease	14% decrease

	F	G	G Depart	H	I
Emphasis on Scenery	47% decrease	34% decrease	34% decrease	85% decrease	1% increase

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E
Management of the North Cascades Scenic Highway	High quality visual setting maintained while providing recreation opportunities	No change	Natural primitive setting maintained except at existing developed sites	Existing scenic values maintained	Natural primitive setting maintained except at existing developed sites
	Over 13,200 acres withdrawn from mineral entry	No change	87,600 acres withdrawn from mineral entry	0 acres withdrawn from mineral entry	87,600 acres withdrawn from mineral entry
	No off-road vehicle use or scheduled timber harvest	ORV use on designated routes	No change in off-road vehicle use or timber activities	Off-road vehicle use and scheduled timber harvest	No change in off-road vehicle use or timber activities

	F	G	G Depart	H	I
Management of the North Cascades Scenic Highway	No change	No change	No change	No change	Natural primitive setting maintained except at existing developed sites 87,600 acres withdrawn from mineral entry No change in off-road vehicle use or timber activities

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Wild and Scenic Rivers	133.5 miles of inventoried condition maintained	10% decrease	2% increase	23% decrease	19% decrease
	F	G	G Depart	H	I
	24% decrease	3% decrease	3% decrease	34% decrease	2% increase

	A Current Direction	B RPA	C	D	E
Allowable Sale Quantity	Departure from non-declining evenflow First decade harvest - 74.4 million board feet (MMBF) per year - 14.3 million cubic feet (MMCF) per year Fifth decade harvest - 50.5 MMBF per year - 10.2 MMCF per year Long run sustained yield 18.1 MMCF per year	Non-declining evenflow First decade - Board foot 5% higher (77.8 MMBF) - Cubic foot 7% higher (15.3 MMCF) Fifth decade - Board foot 50% higher (75.8 MMBF) - Cubic foot 50% higher (15.3 MMCF) Long run sustained yield is 13.2% higher (20.5 MMCF)	Non-declining evenflow First decade - Board foot 28% lower (53.4 MMBF) - Cubic foot 28% lower (10.3 MMCF) Fifth decade - Board foot 1% higher (51.1 MMBF) - Cubic foot 1% higher (10.3 MMCF) Long run sustained yield is 8% lower (16.7 MMCF)	Non-declining evenflow First decade - Board foot 26% higher (93.9 MMBF) - Cubic foot 29% higher (18.5 MMCF) Fifth decade - Board foot 81% higher (91.4 MMBF) - Cubic foot 81% higher (18.5 MMCF) Long run sustained yield is 22% higher (22.1 MMCF)	Non-declining evenflow First decade - Board foot 21% lower (58.9 MMBF) - Cubic foot 20% lower (11.4 MMCF) Fifth decade - Board foot 12% higher (56.4 MMBF) - Cubic foot 12% higher (15.0 MMCF) Long run sustained yield is 18% higher (15.0 MMCF)

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
	F	G	G Depart	H	I
Allowable Sale Quantity (continued)	Non-declining evenflow	Non-declining evenflow	Departure from Non-Declining evenflow	Non-declining evenflow	Non-declining evenflow
	First decade - Board foot 4% higher (77.5 MMBF) - Cubic foot 7% higher (15.3 MMCF)	First decade - Board foot 14% lower (64.2 MMBF) - Cubic foot 13% lower (12.4 MMCF)	First decade - Board foot 8% higher (80.1 MMBF) - Cubic foot 8% higher (15.2 MMCF)	First decade - Board foot 8% lower (68.8 MMBF) - Cubic foot 6% lower (13.4 MMCF)	First decade - Board foot 44% lower (41.5 MMBF) - Cubic foot 44% lower (8.0 MMCF)
	Fifth decade - Board foot 50% higher (75.7 MMBF) - Cubic foot 50% higher (15.3 MMCF)	Fifth decade - Board foot 22% higher (61.4 MMBF) - Cubic foot 22% higher (12.4 MMCF)	Fifth decade - Board foot 3% higher (52.0 MMBF) - Cubic foot 3% higher (10.2 MMCF)	Fifth decade - Board foot 31% higher (66.3 MMBF) - Cubic foot 31% higher (13.4 MMCF)	Fifth decade - Board foot 22% lower (39.6 MMBF) - Cubic foot 22% lower (8.0 MMCF)
	Long run sustained yield is 7% higher (19.3 MMCF)	Long run sustained yield is 10% higher (20.0 MMCF)	Long run sustained yield is 10% higher (20.0 MMCF)	Long run sustained yield is 16% higher (21.0 MMCF)	Long run sustained yield is 24% lower (13.8 MMCF)

	A Current Direction	B RPA	C	D	E
Utilization of Wood Waste	Approximately 840,000 cubic feet (5,600 cords) of wood waste is produced annually from timber harvest activities; availability of wood waste for firewood is directly related to whether motorized access is provided	No change from Current Direction	A 9% decrease in total available firewood	A 37% increase in total available firewood	A 16% decrease in total available firewood

F	G	G Depart	H	I
A 21% decrease in total available firewood	A 4% decrease in total available firewood	A 19% increase in total available firewood	No change from Current Direction	A 29% decrease in total available firewood

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES				
	A Current Direction	B RPA	C	D	E
Silvicultural Treatments	Approximately 6,800 acres regenerated with even-age management annually during the first decade	34% more acres regenerated with even-aged management (9,100 acres)	3% fewer acres regenerated with even-aged management (6,600 acres)	59% more acres regenerated with even-aged management (10,800 acres)	3% fewer acres regenerated with even-aged management (6,600 acres)
	Approximately 3,800 acres per year clearcut or seed tree cut during first decade 1/	74% more acres clearcut or seed tree cut (6,600 acres)	24% more acres clearcut or seed tree cut (4,700 acres)	95% more acres clearcut or seed tree cut (7,400 acres)	16% more acres clearcut or seed tree cut (4,400 acres)
	Approximately 240 acres per year selection cut in first decade	100% more acres selective cut (480 acres)	No acres selective cut (0 acres)	100% more acres selective cut (480 acres)	The same number of acres selective cut (240 acres)

F	G	G Depart	H	I
50% more acres regenerated with even-aged management (10,200 acres)	Same number of acres regenerated with even-aged management (6,800 acres)	13% more acres regenerated with even-aged management (7,700 acres)	13% more acres regenerated with even-aged management (7,700 acres)	29% fewer acres regenerated with even-aged management (4,800 acres)
92% more acres clearcut or seed tree cut (7,300 acres)	26% more acres clearcut or seed tree cut (4,800 acres)	34% more acres clearcut or seed tree cut (5,100 acres)	50% more acres clearcut or seed tree cut (5,700 acres)	16% fewer acres clearcut or seed tree cut 3,200 acres)
50% more acres selective cut (360 acres)	No acres selective cut (0 acres)	No acres selective cut (0 acres)	No acres selective cut (0 acres)	No acres selective cut (0 acres)

1/ Includes non-stocked and poorly growing stands regenerated by other than timber sales

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E
Logging Methods	Average of 7,600 acres per year tractor logged during next 5 decades An average of 2,200 acres per year logged by helicopter or by cable systems during next 5 decades	16% fewer acres tractor logged (6,400 acres/year) 50% more acres logged by cable and helicopter (3,300 acres)	9% fewer acres tractor logged (6,900 (acres) 64% fewer acres logged by cable and helicopter (800 acres)	8% more acres logged by tractor (8,200 acres) 91% more acres logged by cable and helicopter (4,200 acres)	26% fewer acres logged by tractor (5,600 acres) 23% more acres logged by cable and helicopter (2,700 acres)
	F	G	G Depart	H	I
	12% fewer acres tractor logged (6,700 acres) 64% more acres cable and helicopter logged (3,600 acres)	7% fewer acres tractor logged (7,100 acres) 23% fewer acres cable logged (1,700 acres)	4% fewer acres tractor logged (7,300 acres) 23% fewer acres cable and helicopter logged (1,700 acres)	9% more acres tractor logged (8,300 acres) 41% fewer acres logged by cable and helicopter (1,300 acres)	22% fewer acres tractor logged (5,900 acres) 77% fewer acres logged by cable and helicopter (500 acres)
	A Current Direction	B RPA	C	D	E
Management of Lodgepole Pine	Approximately 300 acres per year of lodgepole pine harvested in the first decade	9 times more acres of lodgepole harvested (2,740 acres)	5 times more acres of lodgepole harvested (1,500 acres)	Over 8 times more acres of lodgepole harvested (2,510 acres)	Over 2 times more acres of lodgepole harvested (660 acres)
	F	G	G Depart	H	I
	Almost 8 times more acres lodgepole harvested (2,320 acres)	Over 7 times more acres lodgepole harvested (2,150 acres)	Over 7 times more acres lodgepole harvested (2,150 acres)	Almost 10 more acres lodgepole harvested (2,930 acres)	Over 2 times more lodgepole harvested (700 acres)

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES				
	A Current Direction	B RPA	C	D	E
Management of Wilderness Areas	Western portion Pasayten Wilderness generally in trailless setting; remaining portions Pasayten and Lake Chelan/Sawtooth in a limited trailed or trailed setting No new trailheads to increase or distribute use to currently lightly used aeras Phase out structures not needed for protection or administration Maintain existing livestock grazing levels	No change	Increased trailhead facilities and trail access Decreased livestock grazing levels	Decreased trail access Increased livestock grazing levels	No change
	F	G	G Depart	H	I
	No change	No change	No change	No change	Decreased livestock grazing levels
	A Current Direction	B RPA	C	D	E
Protection of Ecosystems and Environmental Quality	Overall ecosytem and enviromental quality would be protected through Federal and State laws and Forest Service standards and guidelines. Existing environmental quality for soil, water, and air is considered to meet or exceed all existing standards and guidelines	A 9% decrease in environmental quality	A 10% decrease in environmental quality	A 19% decrease in environmental quality	A 14% increase in environmental quality
	F	G	G Depart	H	I
	A 15% decrease in environmental quality	No change	An 8% decrease in environmental quality	No change	A 23% increase in environmental quality

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E
Fire Management Protection	Protection standards and guidelines were developed which are consistent with resource objectives and values. All wildfires that occur will be extinguished within the guidelines of minimizing suppression costs and resource value loss.				
Fuel Treatment	The total acres that require some type of slash fuel treatment for either preparation of the site for planting or treatment of fuels to reduce fire hazard are 6,600	Increase by 14%	Decrease by 17%	Increase by 33%	Decrease by 23%

	F	G	G Depart	H	I
Fire Management Protection	Same as Alternatives A through E				
Fuel Treatment	Increase by 23%	Decrease by 8%	Increase by 13%	Decrease by 3%	Decrease by 41%

-	A Current Direction	B RPA	C	D	E
Protection of Riparian Areas	Visual quality would be emphasized and water, soil, fish, and wildlife values will be maintained	Visual quality would be emphasized but to a lesser degree than Current Direction; water, soil, fish and wildlife values will be maintained	Wildlife and fish values would be emphasized and water and soil values will be maintained	Timber values would be emphasized and water, soil, fish and wildlife will be managed to meet minimum management requirements	Same as D

	F	G	G Depart	H	I
Protection of Riparian Areas	Same as D	Same as Alternative C ------------------------------------> Except in selected visual corridors, wildlife and fish values would be emphasized. Recreation and visual quality would be emphasized in the selected visual corridors.			

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Provide Multiple Use	Commodity production would be the management emphasis on 324.0 thousand acres of the forest	Commodity production would be mgmt emph on 501.6 thousand acres of forest	Commodity production would be mgmt emph on 62.5 thousand acres of forest	Commodity production would be mgmt emph on 849.0 thousand ac of forest	Commodity production would be mgmt emph on 539.3 thousand acres of forest
	Recreation in a natural setting is provided on 587.0 thousand acres	Recreation in a natural setting is provided on 265 thousand acres	Recreation in a natural setting is provided on 415 thousand acres	Recreation in a natural setting is provided on 162 thousand acres	Recreation in a natural setting is provided on 354 thousand acres

ISSUE OR CONCERN	F	G	G Depart	H	I
Provide Multiple Use	Commodity production would be mgmt emph on 614.8 thousand acres of forest	Commodity production would be mgmt emph on 425.9 thousand ac of forest	Commodity production would be mgmt emph on 424.4 thousand ac of forest	Commodity production would be mgmt emph on 252.1 thousand ac of forest	Commodity production would be mgmt emph on 0 thousand acres of forest
	Recreation in a natural setting is provided on 307 thousand acres	Recreation in a natural setting is provided on 385 thousand acres	Recreation in a natural setting is provided on 272 thousand acres	Recreation in a natural setting is provided on 236 thousand acres	Recreation in a natural setting is provided on 465 thousand acres

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Road and Access Management	Approximately 508 miles of arterial and collector roads exist - most arterial and collector roads are managed for general public use except for restrictions of short duration for heavy log haul; approx 1,638 mi of local rds exist - 504 mi of local road are blocked, 654 mi are for high clearance vehicle use and 480 mi are for highway vehicle use - local roads are subject to seasonal use restrictions for wildlife habitat protection, use conflicts between recreationists, and use conflicts between recreationists and commercial hauling - newly constructed local roads will generally be for high clearance vehicle use only - an avg of 33 mi of local rd will be constructed per yr with most newly constructed road available for public use at least seasonally for a period of approx 2 yrs	Same as A, except an average of 50 miles of local road will be constructed per year	Same as A, except an average of 34 miles of local road will be constructed per year; very few restrictions on arterials and collectors would be necessary due to less hauling	Same as A, except an average of 57 miles of local road will be constructed per year; more restrictions on arterials and collectors would be necessary due to more hauling	Same as A, except an average of 22 miles of local road will be constructed per year

ISSUE OR CONCERN	F	G	G Depart	H	I
Road and Access Management	Same as A, except an average of 46 miles of local road will be constructed per year	Same as A, except an average of 43 miles of local road will be constructed per year	Same as A, except an average of 43 miles of local road will be constructed per year	Same as A, except an average of 46 miles of local road will be constructed per year	Same as A, except an average of 19 miles of local road will be constructed per year; very few restrictions on arterials and collectors would be necessary due to less hauling

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIV

	ALTERNATIVES									
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E	F	G	G Depart	H	I
RPA Targets - Timber	First decade harvest - Board foot 28% less than RPA (74.4 MMBF) - Cubic foot 32% less than RPA (14.3 MMCF) Fifth decade harvest - Board foot 51% less than RPA (50.5 MMBF) - Cubic foot 51% less than RPA (10.2 MMCF)	First decade - Board foot 25% less than RPA (77.8 MMBF) - Cubic foot 27% less than RPA (15.3 MMCF) Fifth decade - Board foot 27% less than RPA (75.7 MMBF) - Cubic foot 27% less than RPA (15.3 MMCF)	First decade - Board foot 49% less than RPA (53.4 MMBF) - Cubic foot 51% less than RPA (10.3 MMCF) Fifth decade - Board foot 51% less than RPA (51.0 MMBF) - Cubic foot 51% less than RPA (10.3 MMCF)	First decade - Board foot 10% less than RPA (93.9 MMBF) - Cubic foot 12% less than RPA (18.5 MMCF) Fifth decade - Board foot 12% less than RPA (91.6 MMBF) - Cubic foot 12% less than RPA (91.6 MMCF)	First decade - Board foot 43% less than RPA (58.9 MMBF) - Cubic foot 46% less than RPA (11.4 MMCF) Fifth decade - Board foot 46% less than RPA (56.4 MMBF) - Cubic foot 46% less than RPA (11.4 MMCF)	First decade - Board foot 25% less than RPA (77.5 MMBF) - Cubic foot 27% less than RPA (15.3 MMCF) Fifth decade - Board foot 27% less than RPA (75.7 MMBF) - Cubic foot 27% less than RPA (15.3 MMCF)	First decade - Board foot 38% less than RPA (64.2 MMBF) - Cubic foot 41% less than RPA (12.4 MMCF) Fifth decade - Board foot 41% less than RPA (61.4 MMBF) - Cubic foot 41% less than RPA (12.4 MMCF)	First decade - Board foot 23% less than RPA (80.1 MMBF) - Cubic foot 26% less than RPA (15.5 MMCF) Fifth decade - Board foot 50% less than RPA (57.0 MMBF) - Cubic foot 50% less than RPA (10.5 MMCF)	First decade - Board foot 34% less than RPA (68.8 MMBF) - Cubic foot 36% less than RPA (13.4 MMCF) Fifth decade - Board foot 36% less than RPA (66.3 MMBF) - Cubic foot 36% less than RPA (13.4 MMCF)	First decade - Board foot 60% less than RPA (41.5 MMBF) - Cubic foot 62% less than RPA (8.0 MMCF) Fifth decade - Board foot 62% less than RPA (39.6 MMBF) - Cubic foot 62% less than RPA (8.0 MMCF)

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E	F	G	G Depart	H	I
RPA Targets - Trail Construction and Reconstruction	First decade (62 miles/year) 76% less than RPA Fifth decade (75 miles/year) 80% less than RPA	First decade 84% less than RPA Fifth decade 87% less than RPA	First decade 60% less than RPA Fifth decade 66% less than RPA	First decade 84% less than RPA Fifth decade 87% less than RPA	First decade 35% less than RPA Fifth decade 47% less than RPA	First decade 84% less than RPA Fifth decade 87% less than RPA	First decade 52% less than RPA Fifth decade 60% less than RPA	First decade 52% less than RPA Fifth decade 60% less than RPA	First decade 84% less than RPA Fifth decade 87% less than RPA	First decade 35% less than RPA Fifth decade 47% less than RPA
RPA Targets - Developed Rec	First decade (358 M RVDs/year) 74% more than RPA Fifth decade (360 M RVDs/year) 189% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA	First decade 64% more than RPA Fifth decade 173% more than RPA	First decade 64% more than RPA Fifth decade 173% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA	First decade 66% more than RPA Fifth decade 177% more than RPA	First decade 74% more than RPA Fifth decade 189% more than RPA

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES				
	A Current Direction	B RPA	C	D	E
RPA Targets - Dispersed Recreation (non-wilderness)	First decade (615 M RVDs/year) 15% less than RPA Fifth decade (620 M RVDs/year) 33% more than RPA	First decade 23% less than RPA Fifth decade 19% more than RPA	First decade 17% less than RPA Fifth decade 28% more than RPA	First decade 23% less than RPA Fifth decade 19% more than RPA	First decade 25% less than RPA Fifth decade 49% more than RPA
	F	G	G Depart	H	I
	First decade 23% less than RPA Fifth decade 19% more than RPA	First decade 19% less than RPA Fifth decade 26% more than RPA	First decade 19% less than RPA Fifth decade 26% more than RPA	First decade 19% less than RPA Fifth decade 26% more than RPA	First decade 23% less than RPA Fifth decade 19% more than RPA
	A Current Direction	B RPA	C	D	E
RPA Targets - Range	First Decade (60 M AUMs) 3% increase Fifth Decade (66 M AUMs) 8% decrease	First decade 10% increase Fifth decade 2% decrease	First decade No change Fifth decade 10% decrease	First decade 27% increase Fifth decade 14% increase	First decade 3% increase Fifth decade 11% decrease
	F	G	G Depart	H	I
	First decade 5% increase Fifth decade 5% decrease	First decade 7% increase Fifth decade 8% decrease	First decade 8% increase Fifth decade 8% decrease	First decade 13% increase Fifth decade 2% decrease	First decade 5% decrease Fifth decade 21% decrease

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E
RPA Targets - Wildlife	Trends of mule and white-tailed deer (see Maintenance of Big Game Populations)				
	Trends of cavity-nesting birds (see Habitat for Small Game and Non-Game Wildlife Species)				
	Trends of resident trout and anadromous fish (see Habitat for Anadromous Fish and Trout)				
	Wildlife habitat improvements - First decade - acres 100% less than RPA (0)	First decade acres 67% less than RPA (2,400)	First decade acres meet RPA (7,300)	First decade Same as A	First decade Same as A
	Fifth decade - acres 100% less than RPA (0)	Fifth decade acres 45% less than RPA (1,700)	Fifth decade acres 61% more than RPA (5,000)	Fifth decade Same as A	Fifth decade Same as A
	Anadromous fish habitat improvement - First decade - pounds of fish 100% less than RPA (0) Fifth decade - pounds of fish 100% less than RPA (0)	First decade Same as A Fifth decade Same as A	First decade Same as A Fifth decade Same as A	First decade Same as A Fifth decade Same as A	First decade Same as A Fifth decade Same as A

F	G	G Depart	H	I
Same as above				
Same as above				
Same as above				
First decade Same as A Fifth decade Same as A	First decade Same as B Fifth decade Same as B	First decade Same as B Fifth decade Same as B	First decade Same as B Fifth decade Same as B	First decade Same as C Fifth decade Same as C
First decade Same as A Fifth decade Same as A	First decade Same as A Fifth decade Same as A	First decade Same as A Fifth decade Same as A	First decade Same as a Fifth decade Same as A	First decade Same as A Fifth decade Same as A

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E	F	G	G Depart	H	I
Roadless Area Management	149,000 acres of inventoried roadless areas managed as unroaded	13% increase	146% increase	100% decrease	223% increase	93% increase	39% increase	39% increase	57% decrease	219% increase
Encouragement of Minerals Activities	Moderate 2/	Moderate	Low	High	Moderate	Moderate	Moderate-High	Moderate-High	Moderate-High	Moderate-Low

2/ From Table IV-8, Chapter IV, Minerals

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES									
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E	F	G	G Depart	H	I
Lifestyle Effects on Okanogan County Residents	Quality of life would be slightly reduced from existing levels; quality of life is defined in terms of changes in air quality, wildlife, population and recreation opportunities; most "quality of life" differences can be attributed to factors outside the domain of forest planning, which are constant across alternatives; therefore, "quality of life" changes are slight across alternatives	Quality of life would decrease slightly	Quality of life would be higher slightly	Quality of life would decrease the most, though still only slightly	Quality of life would be higher slightly	Quality of life would decrease slightly	Quality of life would be slightly higher	Quality of life would decrease slightly	Quality of life would be about the same as existing	Quality of life would be highest

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES				
	A Current Direction	B RPA	C	D	E
Threatened, Endangered and Sensitive Species	T&E species and habitat will be protected and managed according to Endangered Species Act and Recovery Plans	Same as A	Same as A	Same as A	Same as A
	Spotted owl (sensitive species) habitat capability will be reduced by 2 pairs in 10 years and by 3 pairs in 50 years from existing condition	Spotted owl (sensitive species) habitat capability will be higher than in Current Direction; minimum management requirements will retain existing habitat capability at status quo	Same as B	Same as B	Same as B

F	G	G Depart	H	I
Same as Alternatives B through E				

	A Current Direction	B RPA	C	D	E
Habitat for Anadromous Fish and Trout	Habitat capability for salmon, steelhead and trout will not significantly change over time (status quo)	Same as A	Same as A	Same as A	Same as A

F	G	G Depart	H	I
Same as A	Same as A	Same as A	Same as A	Same as A

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES				
	A Current Direction	B RPA	C	D	E
Maintenance of Big Game Populations	Deer winter range habitat capability would decrease 8% from existing levels in 10 years and 40% in 50 years; other big game habitats will receive minimal consideration in forest management	Increase of 2% (10 year) and 55% (50 year) in DWR habitat capability over Current Direction; minimum consideration for other big game habitat	Increase of 9% (10 year) and 55% (50 year) in DWR habitat capability over Current Direction; high emphasis for other big game habitat	Decrease of 11% (10 year) and 21% (50 year) in DWR habitat capability over Current Direction; minimum consideration for other big game habitat	Decrease of 2% (10 year) and 6% (50 year) in DWR habitat capability over Current Direction; minimum consideration for other big game habitat
	In the Methow Valley, deer winter range habitat capability would decrease	Habitat capability would be greater than Current and remain at existing level	Same as B	Habitat capability would be similar to Current, and decrease from existing level	Same as D

ISSUE OR CONCERN	F	G	G Depart	H	I
Maintenance of Big Game Populations	Decrease of 11% (10-year) and increase of 28% (50-year) in DWR hab. cap. from Current Direction; bighorn sheep habitat is emphasized; minimum consideration for other big game habitat	Increase of 2% (10 year) and 76% (50 year) in DWR habitat capability from Current Direction; high emphasis for other big game habitat	Increase of 2% (10 year) and 76% (50 year) in DWR habitat capability from Current Direction; high emphasis for other big game habitat	Increase of 2% (10 year) and 67% (50 year) in DWR habitat capability from Current Direction; high emphasis for other big game habitat	Increase of 9% (10 year) and 67% (50 year) in DWR habitat capability from Current Direction; high emphasis for other big game habitat
	Habitat capability would be greater than Current, remaining at existing level in 1st decade and increasing approx. 20% by 5th decade	Same as F	Same as F	Same as F	Same as B

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

	ALTERNATIVES				
ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Habitat for Small Game and Non-Game Wildlife Species	Habitat capability changes in 10 and 50 years from existing: - 9 and 32% decrease in old growth/mature wildlife - 2 and 12% decrease snag dependent wildlife--outside wilderness - 0 and 5% decrease in lynx - 2 and 7% increase in ruffed grouse	Change from Current: - 0 and 2% decrease old growth/mature - 2 and 9% increase snags - 33 and 71% increase lynx - 1 and 1% increase ruffed ruffed grouse	Change from Current: - 3 and 11% increase old growth/mature - 2 and 16% increase snag - 35 and 132% increase lynx - 1 and 3% decrease in ruffed grouse	Change from Current: - 4 and 18% decrease old growth/mature - 2 and 2% decrease snag - 40 and 71% increase lynx - 2 and 6% decrease in ruffed grouse	Change from Current: - 3 and 8% increase old growth/mature - 2 and 2% decrease snag - 0 and 50% increase lynx - 2 and 6% decrease in ruffed grouse
	A Current Direction	B RPA	C	D	E
Level of Grazing	Existing capacity is 64 M AUM's; current direction would decrease this by 2 M AUM's (10% during decade 1)	Increases 5 M AUM's (8%)	Decreases 2 M AUM's (3%)	Increases 14 M AUM's (23%)	Same as A

ISSUE OR CONCERN	F	G	G Depart	H	I
Habitat for Small Game and Non-Game Wildlife Species	Change from Current: - 2 and 12% decrease old growth/mature - 2 and 9% increase snags - 33 and 71% increase lynx - 2 and 6% decrease ruffed grouse	Change from Current: - 2 and 5% increase old growth/mature - 2 and 14% increase snag - 73 and 150% increase lynx - 1 and 2% increase ruffed grouse	Change from Current: - 1% decrease & 5% increase growth/mature - 2 and 14% increase snag - 73 and 150% increase lynx - 1 and 2% increase ruffed grouse	Change from Current: - 1 and 0% increase old growth/mature - 4 and 23% increase snag -128 and 189% increase lynx - 1 and 3% increase ruffed grouse	Change from Current: - 4 and 20% increase old growth/mature - 2 and 16% increase snag - 15 and 55% increase lynx - 0 and 1% increase ruffed grouse
Level of Grazing	Increases 1 M AUM's (2%)	Increases 2 M AUM's (3%)	Increases 3 M AUM's (5%)	Increases 6 M AUM's (10%)	Decreases 5 M AUM's (9%)

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	ALTERNATIVES A Current Direction	B RPA	C	D	E	F	G	G Depart	H	I
Increase Economic Efficiency Present Net Value for 15 Decades	317 million dollars	Decreases by 24%	Decreases by 4%	Decreases by 18%	Decreases by 21%	Decreases by 19%	Decreases by 11%	Decreases by 9%	Decreases by 12%	Decreases by 16%
Harvest of Timber Where Not Cost Efficient	Employ cost effective methods. Costs may exceed revenues when needed to meet other resource objectives	Same as A	Generally, no harvest where costs exceed benefits.	Employ cost effective methods.	Same as D	Same as D	Same as C	Same as C	Same as A	No timber harvest where costs exceed revenues

TABLE II-1

COMPARISON OF ISSUE AND CONCERN RESPONSE BY ALTERNATIVE

ISSUE OR CONCERN	A Current Direction	B RPA	C	D	E
Economic Effects on Local People Employment Potential (next 10 years)	Future timber-related employment potentials decrease over existing levels	Timber-related employment potentials increase over existing levels	Timber-related employment potentials decrease over existing levels	Provides greatest increase in timber employment potential	Timber-related employment potentials decrease over existing levels
Research Natural Areas	Wolf Creek RNA maintained	Wolf Creek RNA maintained, Maple & Tiffany Mtn. RNAs established	Wolf Cr. RNA maintained, Maple and Tiffany Mtn. established	Wolf Cr. RNA maintained	Wolf Cr. RNA maintained

ISSUE OR CONCERN	F	G	G Depart	H	I
Economic Effects on Local People Employment Potential (next 10 years)	Timber-related employment potential increases over existing levels	Timber-related employment potential decreases	Timber-related employment potential increases over existing levels	Timber-related employment potential decreases	Timber-related employment potential greatly decreases
Research Natural Areas	Wolf Cr. RNA maintained	Wolf Cr. RNA maintained, Maple and Tiffany Mtn. established	Wolf Cr. RNA maintained, Maple and Tiffany Mtn. established	Wolf Cr. RNA maintained, Maple and Tiffany Mtn. established	Wolf Cr. RNA maintained, Maple and Tiffany Mtn. established

MANAGEMENT AREAS

Management Areas are pieces of National Forest land to which a specific set of management practices can be applied. All the Management Areas considered in the alternatives are briefly described below. Full descriptions of the Management Areas can be found either in the Forest Plan (for the proposed action) or in the planning files at the Okanogan National Forest Supervisor's office.

Descriptions include both where each emphasis could be applied and what type of management would be allowed. The "where" is described in terms of the bio-physical character of the lands to which an emphasis would be applied in combination with each alternative's map (see Map Package). The "what" is described both by proposed management direction and expected end results.

MANAGEMENT AREA 1

This could be applied to lands suitable for timber production (see the Unsuited and Non-forest Lands map). The emphasis would be to manage forest lands to provide a high level of timber using a full range of silvicultural practices. Transitory use of the range forage by domestic animals would be encouraged as a secondary emphasis.

Precommercial thinning and commercial thinning may be prescribed. Regimes where only precommercial thinning is utilized may be applied in favor of regimes which also involve commercial thinning if necessary to more rapidly achieve a regulated forest. Commercial thinning, when it occurs, would generally be limited to tractor and short-span cable operable ground on more productive sites. Rotations would be based on reaching maturity. Created openings would be as large as 40 acres unless excepted by reasons stated in the Regional Guide. An adequate transportation system would be developed and maintained to facilitate timber management activities. The resource protection goal would be to minimize losses to the timber resource from wildfires, insects, disease and weeds.

Mapped inclusions of lands unsuited for timber management but suited for range management would be managed as per Management Area 3. Those lands unsuited for either use would be managed as per management area 16.

MANAGEMENT AREA 2

This could be applied to suitable range land that is also suited for timber management (see the Unsuited and Non-forest Lands map). The emphasis of the area would be to intensively manage range land while providing a reduced flow of timber harvest. Timber harvest schedules would be required to conform to range objectives.

Management seeks to optimize production and utilization of forage available for livestock use consistent with maintaining the environment and providing for multiple-use of the range. Cultural practices such as brush control or seeding may be combined with fencing and water developments to implement complex grazing systems. Created openings (clearcuts, seed tree cuts and overstory removals) would generally be less than 40 acres in size unless excepted for reasons state in the Regional Guide.

MANAGEMENT AREA 3

This could be applied to suitable range land that is not capable of producing 20 cubic feet of timber per acre per year but is located outside classified areas (Wilderness, Research Natural Areas and Classified Scenic Areas). The emphasis would be intensive rangeland management.

Management seeks to optimize production and utilization of forage available for livestock use consistent with maintaining the environment and providing for multiple-use of the range. Cultural practices such as brush control or seeding may be combined with fencing and water developments to implement complex systems. Timber harvest is an available tool, as is fire, but harvest would not be scheduled.

MANAGEMENT AREA 4

This could be applied to those lands inventoried as semi-primitive (see the Recreation Opportunity Spectrum Resource map). These areas are larger than 2,000 acres where trails are evident. The emphasis in these areas is to provide summer and fall non-motorized recreational opportunities in a semi-primitive setting.

Recreation opportunities would be provided in areas characterized by a predominantely natural or naturally-appearing environment of moderate to large size. Interaction between users would usually be low. Areas would be managed in such a way that minimum on-site controls and restriction may be present, but are subtle. Recreation facilities would only be provided for resource protection or to maintain or enhance recreation opportunities.

No roads would be constructed and existing roads would be inactivated with the following exception: reasonable access would be provided for mineral exploration entry. Roads may be constructed if a site specific analysis determines that roading is the only way to provide reasonable access. Trail access would be provided to maintain or enhance recreation opportunities or to meet recreation demand. Trails would be designed to the level appropriate to the target non-motorized user group. Motorized vehicle use would not be permitted summer and fall. Motorized vehicle use would be permitted winter and spring unless prohibited. Mechanized equipment may be used for trail maintenance during low use periods.

Only sanitation and salvage harvest may occur and this would be determined on a case-by-case basis. Domestic livestock grazing would be permitted but would conform with the needs of recreation. All wildfires would be confined and prescribed fire may be used to meet land management objectives.

MANAGEMENT AREA 4m

This could be applied to the same areas as could Management Area 4. The difference between the areas is that this one would emphasize motorized, rather than non-motorized, recreation. Motorized use would be restricted year-round to designated trails or areas. No new roads would be constructed with the following exception: reasonable access would be provided for mineral exploration entry. Roads may be constructed if a site-specific analysis determines that roading is the only way to provide reasonable access. Existing roads would be maintained at a standard to accept or encourage off-road, 4-wheel vehicles. Designated trails would be maintained to a level that encourages motorized 2-wheel trail vehicles. Direction for non-recreation resource management would be the same as for Management Area 4.

MANAGEMENT AREA 5

This could be applied to any acre with an inventoried Visual Quality Objective of retention or partial retention and the classified scenic area (North Cascades Scenic Highway).

Activities would be required to meet the Visual Quality Objective within 3 years of activity. Roaded recreation opportunities and viewing experiences would be maintained or enhanced within selected viewsheds by maintaining a predominately natural appearing landscape with a diversity of age classes, size classes and species. Management activities would not be evident to the casual visitor or evident but subordinate to the surrounding landscape.

Timber would be managed on suitable and available lands, though at a reduced level in recognition of the major emphasis. In some areas in some alternatives timber harvest would not be scheduled. Those areas are indicated within the description of each alternative. Where timber management is practiced, both regeneration and intermediate harvest would occur. Vegetation would be managed to maintain retention or partial retention visual quality levels in perpetuity. In retention foreground areas, activities would be designed to provide trees greater than 24" dbh in mixed conifer and 10" dbh in lodgepole. In retention middleground areas, activities would be designed to provide trees greater than 18" dbh in mixed conifer and 7" dbh in lodgepole. In partial retention areas, activities would be designed to provide trees greater than 16" dbh in mixed conifer and 7" dbh in lodgepole.

Arterial and collector roads would be reconstructed and maintained to encourage use by recreationists in highway vehicles. Local roads to developed recreation sites would be operated to encourage highway vehicles. Other local roads would be operated to accept high clearance vehicles. Motorized vehicle use (except snow machines) would be eliminated or prohibited on roads that exceed a road density of 3 miles per square mile to limit wildlife harassment. Trails may be constructed, reconstructed and maintained to access special features, classified areas, recreation management emphasis areas, or to enhance developed site opportunities.

Recreation facilities would only be provided for resource protection.

All identified deer winter range would be managed for a minimum of 25%-35% winter range cover, where possible. On deer non-winter range, the minimum cover amount would be 30% summer range cover. Snags would be provided at the 40% level where possible.

Domestic livestock grazing would be permitted, but would conform with the needs of recreation.

All wildfires would be controlled at 10 acres or less, except that fires may be contained in fire tolerant stands when the fire intensity level is very low.

MANAGEMENT AREA 6

This would only apply to that area included in the North Cascade Scenic Highway designated by Congress in the Washington State Wilderness Act of 1984. The emphasis would be to maintain the natural scenic quality and integrity of the North Cascade Scenic Highway in accordance with the Washington State Wilderness Act of 1984.

No timber management activities (including sanitation and salvage) would be permitted outside developed recreation sites. Non-scheduled harvests would be permitted in developed recreation sites when they would be the best method of achieving vegetation management objectives. Timber activities at developed sites limited to hazard tree removal. No suppression of insects and disease would take place.

No new roads would be permitted except where necessary to provide reasonable access to existing valid claims or leases. Local roads needed for recreation would be operated to encourage use by highway vehicles. All other local roads would be evaluated and inactivated as feasible. Motorized vehicle use would be permitted on designated major roads. Helicopter assisted skiing prohibited. Trail construction would be limited to relocation of existing trails necessary for resource protection, public safety and protection of capital investments.

No new developed sites or facilities outside of existing developed sites would be constructed.

Domestic livestock grazing would not be permitted.

Utility structures would not be permitted and no rights-of-way would be granted, except reasonable access would be provided to existing valid mineral claims and uses.

Denial of Federal Energy Regulatory Commission applications would be recommended. All areas not within existing valid claims and/or leases would be recommended for withdrawal from mineral entry.

All wildfires would be confined, except those that threaten public safety, capital investments or enter areas with a different fire management strategy; the fire suppression strategy under these exceptions would be control or contain. No use of prescribed fire would be allowed.

MANAGEMENT AREA 7

This would only apply to that area included in the North Cascade Scenic Highway designated by Congress in the Washington State Wilderness Act of 1984. The emphasis would be to maintain a high quality visual setting within the North Cascade Scenic Highway while providing recreational opportunities.

Timber management activities would only be permitted when necessary to enhance recreation and scenic opportunities. Suppression of insects and disease may occur.

Only those new roads necessary to enhance recreation opportunities or to provide reasonable access to valid mineral claims and leases would be constructed. Local roads needed for recreation would be constructed. Local roads needed for recreation would be operated to encourage use by highway vehicles. All other local roads would be evaluated and inactivated as feasible. Motorized 2-wheel trailbike use would be encouraged on designated routes. Helicopter assisted skiing would be permitted. Trails may be constructed, reconstructed and maintained to access special features, classified areas, recreation management emphasis areas or to enhance developed site opportunities. Trails would be maintained to a level that is appropriate to the target user group.

New developed sites, existing site expansion and facilities outside developed sites would only be provided to maintain or enhance recreation opportunities or meet recreational use demands.

Wildlife habitat improvements consistent with the management emphasis would be allowed.

Domestic livestock grazing would not be permitted.

Recommend denial of all applications which are inconsistent with the visual and recreation objectives. No rights-of-way would be granted, except reasonable access would be provided to valid mineral claims and/or leases. Route selection would retain scenic values. The existing mineral withdrawal would be retained.

All wildfires would be confined, except those that threaten public safety, capital investments or enter areas with a different management strategy; these fires would be contained or controlled. Prescribed fire may be used to meet land and resource management objectives.

Helicopter assisted skiing would be permitted.

MANAGEMENT AREA 8

This would be applied to the existing and the inventoried potential Research Natural Areas on the Okanogan National Forest. The areas contain examples of typical natural ecosystems or unique kinds of vegetation, animals and land. The purpose of this emphasis would be to reserve those lands for scientific and educational use.

MANAGEMENT AREA 9

This would be applied to inventoried areas where deer spend winter and to fawning areas (see the Wildlife Habitat Inventory map). The emphasis would be to manage deer winter range and fawning habitats to provide conditions which can sustain optimal numbers of deer indefinitely, without degrading habitat characteristics such as forage, cover and soil.

Timber would be managed on suited acres though at a reduced level in recognition of the major emphasis. Created openings would be 40 acres or less in size in deer winter range and 5 acres or less in fawning areas. The following essential cover types would be provided: snow intercept/thermal to reduce the energy expense and to provide accessibility to forage in times of deep snow; hiding cover to provide security from predators and human harassment. Specific cover unit sizes and other habitat conditions are described in Appendix F. Forage, such as shrubs, grasses, forbs and lichens, would be managed in combination with cover types to contribute to this emphasis.

Wildlife trees (including snags) would be provided to support near maximum potential woodpecker populations. Open road densities would be less than two miles per square mile. In fawning areas, disturbance from concentrations of humans and livestock should be minimized during June, when most fawning occurs. Motor vehicles would be prohibited except where designated open. Cross-country ski trails and snowmobiling would be prohibited, with some through route exceptions. Motorized vehicle access would be resticted where timber management occurs and generally prohibited during winter and limited in fawning areas during June.

MANAGEMENT AREA 10

The emphasis is to optimize habitat condition and perpetuate a healthy mountain goat population. This is applicable to mountain goat habitat, more than half of which is located in wilderness or classified scenic areas (see the Wildlife Habitat Inventory map).

Essential cover types and forage would be maintained or managed to the extent possible in these rugged locations. Livestock control and prescribed fire would be the primary means of vegetative manipulation, and timber management may be allowed on a non-scheduled basis where mountain goats would be benefited. Wildlife trees (including snags) would be provided to support near maximum potential woodpecker populations.

Human disturbance would be minimized. Recreation special use permits would not be authorized for helicopter flights over or landing in areas where goats would be disturbed. Motorized travel would be prohibited, except where designated open.

MANAGEMENT AREA 11

The emphasis is to manage bighorn sheep habitat to optimize habitat conditions and perpetuate a healthy population. This could be applied to the west side of Mt. Hull where sheep reside yearlong or in the Pasayten Wilderness around Cathedral Peak (see the Wildlife Habitat Inventory map).

Manage for sheep habitat by providing cover unit sizes and other conditions described in Timber/Deer Coordination Report (Okanogan National Forest memo dated October 25, 1983 - see Appendix F). Forage such as shrubs, grasses, forbs and lichens would be managed in combination with cover types to meet winter range goal.

In mixed conifer stands, wildlife trees (including snags) would be provided to support near maximum potential woodpecker populations. Uncharred woody debris (slash) would be retained as necessary in the form of sound logs and slash accumulations. Hardwood types would be represented and perpetuated along with conifer management. Acceptable tree height at which openings no longer exist is 6 feet. Cover for other wildlife species would be provided by applying the above cover conditions.

Motorized travel would be confined to designated routes. Logging would be decided on a case-by-case basis.

MANAGEMENT AREA 12

Manage suitable forest lands to maximize production of merchantable wood fibre while achieving a high present net worth and while providing and perpetuating a diverse mosaic of stand ages and conditions for the benefit of wildlife present, specifically the lynx. This applies to the vast area of lodgepole and associated species between Buck Pass and the Pasayten Wilderness, above 4500 feet.

Harvest units (clearcut, seed tree, shelterwood, partial cut, intermediate and timber stand improvement) would generally be 40 acres or less in size, and 1200 feet or less in width.

Specific conditions for lynx in lodgepole dominated (but including other associated species) sites are as follows: lodgepole would be perpetuated, not converted to other tree species. Different size and shape units of successional stages would be created. Cover for seclusion and hunting would be connected by cover corridors in a mostly continuous manner. Cover unit size is 20 acres or more; cover corridor width is 300 feet or more; and cover canopy height is 6 feet or more. Cover amounts necessary are 50% minimally and 70% or more optimally per 160 acres of lodgepole type. Clearcuts should be designed to maintain cover corridors rather than disrupting corridors. Cover would be emphasized on major ridges and saddles of ridges.

Wildlife trees (including snags) would be provided to support optimal potential woodpecker populations in mixed conifer inclusions. Uncharred woody debris (slash) would be retained as necessary in the form of sound logs and slash accumulations. Hardwood types would be repreof sound logs and slash accumulations. Hardwood types would be represented and perpetuated along with conifer management. The height at which openings no longer exist is 6 feet. Clearcuts and shelterwood entries would be less than 40 acres and 100 acres, respectively.

Open road densities would be less than 2 miles per square mile. Snowmobiling would not be permitted, except on designated routes. Roads would be planned, constructed and managed as follows: (a) Minimize numbers of main access roads to aid law enforcement of State wildlife laws, especially to control illegal taking of lynx; (b) Construct dead end roads rather than loop roads to aid law enforcement; (c) Construct and maintain roads to minimum possible standards to discourage heavy use; (d) Design road systems that can be gated or blocked in part or whole to reduce disturbance and aid law enforcement; (e) Eliminate or block secondary access roads to reduce disturbance and aid law enforcement.

MANAGEMENT AREA 13

The goal would be to provide a diversity of good quality riparian and aquatic habitats for maximum, sustained use by all associated wildlife. This applies to areas of perennial or intermittent streams, areas of standing water and areas with a permanent or seasonal high water table. These zones have riparian vegetation requiring large amounts of available water year-round and seasonally. The width of riparian areas depends upon slope and vegetative cover, but as a minimum, it includes the area within 100 feet slope distance from the high water mark on each side of perennial streams, lakes or marshes.

Wildlife trees (including snags) would be provided to support maximum potential woodpecker populations. Untreated woody debris (slash) and uncharred, sound logs would be retained as necessary to maximize habitat potential. All ecoclass types and different vegetative conditions (seral stages), including old growth, would be represented. Structural habitat in perennial streams would be maintained or improved to produce fish (e.g. certain large woody debris can be left to help form pools). Amount of edge contrast (ecotones) would be maximized where timber management occurs. Acceptable tree height at which openings no longer exist is 6 feet. Cover for many wildlife species would be provided and the amounts, ratios and characteristics for summer thermal, hiding and fawning cover types would be applied to achieve this (Timber/Deer Coordination Report, Appendix F). Generally, wildlife travel corridors that provide cover would be maintained along the entire length of riparian zones, on at least one side of the drainage. Corridor interruptions (affecting both sides of drainage) would be 200 feet or less across.

Streambanks would be maintained in stable condition; erosion and sediment into water bodies would be minimized; and State and Federal water quality standards would be met. Hardwood regeneration would be protected (at least 75%) from grazing and concentration of livestock would be avoided.

Timber management would be practiced on the lands suited for timber harvest but at a greatly reduced level to protect the wildlife habitat values present. Harvest units (clearcut, seed tree, shelterwood, partial cut, intermediate and timber stand improvement) would generally be 300 feet or less in width on one side of a stream, or 200 feet or less in width on both sides of a stream. Complete canopy removal can be acceptable. Total stream length affected by timber harvest would be 15% or less per decade. In other riparian areas, such as areas with seasonally saturated soils, harvest or thinning entries would generally be 5 acres or less.

New roads and access would be constructed only when necessary to cross drainages. Fish passage up and down streams would be unobstructed to the extent practical unless a water resource development project is needed. In such a case an environmental analysis would be completed to help make the decision.

MANAGEMENT AREA 14

The emphasis would be to provide a sustained, even-flow of timber while providing a diversity of wildlife habitats with near optimal distribution. It would apply to areas where wildlife values are present and the lands are suited for timber management. Areas not suited for timber management would be managed with a wildlife habitat emphasis.

Harvest units (clearcut, seed tree, shelterwood, partial cut, intermediate and timber stand improvement) would generally be 100 acres or less in size and 1200 feet or less in width.

Wildlife trees (including snags) would be provided to support optimal potential woodpecker populations. Uncharred woody debris (slash) would be retained as necessary in the form of sound logs and slash accumulations. Hardwood types would be represented and perpetuated along with conifer management. Acceptable tree height at which openings no longer exist is 6 feet. Cover for many wildlife species would be provided over 40% of the area - the amounts, ratios and characteristics for summer thermal and hiding cover types would be applied to achieve this (Timber/Deer Coordination Report, Appendix F). Cover for wildlife travel corridors would be provided as necessary.

Open road densities would be less than 2 miles per square mile. Cross-country ski trails and snowmobiling would be limited on deer winter range and where winter logging occurs. Motorized vehicle access would be limited to avoid wildlife harassment and timber management conflicts as needed.

MANAGEMENT AREA 15

The emphasis would be to provide a wilderness setting with access ranging from no trails to constructed trails. Some areas would have access limited to trails necessary to pass through the area. This strategy is applicable to those areas within existing wilderness.

Wilderness opportunities would be provided in areas characterized by a predominantly unmodified environment of moderate to large size. Users would have an extremely high to high probability of experiencing isolation from the sights and sounds of humans, independence and application of outdoor skills in an environment that offers an extremely high to high degree of challenge or risk. Interaction between users would be very low to moderate and evidence of other users is minimal to often present. Human-induced restrictions and controls would be absent or, if present, are subtle. All activities would conform with Region 6 guidelines, and follow the non-degradation policy. No additional outfitter-guide permits would be issued for the high hunt period in those of wilderness emphasizing limited trailed or trailed opportunities. In those areas emphasizing trailless opportunities, no additional outfitter-guide permits would be issued and existing permits would not be reissued upon termination or expiration.

Use of fuelwood is limited to dead and down material. Domestic livestock grazing would continue on existing allotments. Facilities would be permitted, but must be necessary to protect the range and/or wilderness resource, rather than to increase livestock numbers. Unplanned human-caused wildfires would be controlled. Mineral activity would be limited to valid claims and leases. The method of access would be that which creates the least lasting impacts on the wilderness resource while meeting the needs of the claimant. Mineral operating plans and special use permits would ensure that adverse impacts are mitigated or corrected as soon as possible.

Unplanned human-caused wildfires would be controlled. Unplanned natural wildfires would generally be confined. Prescribed fire would not be used.

MANAGEMENT AREA 16

This wouldn't be a separate management area but the acres involved are mapping inclusions within the management areas in which timber harvest would be schedlued. Timber harvest would not be scheduled on these inclusions even though the areas may be capable of growing commercial forests, because of the goals, standards or guidelines of the alternative. The most usual reason is management costs exceeding expected benefits. The standards and guidelines for managing these inclusions would otherwise be the same as those for the management areas in which they occur.

MANAGEMENT AREA 17

The emphasis would be to provide a range of developed recreation opportunities in a roaded setting. This strategy would be applied to all developed recreation sites, including private sector sites, outside the North Cascade Scenic Highway. This includes, but is not limited to, campgrounds, picnic grounds, boat sites, trailheads, observation sites, interpretive sites, sno-parks, downhill ski areas, organization sites and summer home areas. The area allocated to this use includes only the specific site development. Areas of influence are not included.

Facilities would be provided for the convenience and safety of the forest visitor where opportunities for meaningful recreation experiences are present. Concentration of users range from low to high. Sites would be managed in such a way that controls and restrictions are obvious.

All fee sites and trailheads serving trails leading to classified areas and recreation management emphasis areas would be maintained to standard. Facilities at non-charge sites may be maintained to less than standard.

New site construction, existing site expansion and major site upgrading would only be accomplished to meet additional demands or to enhance recreation opportunities.

All new developed sites would be recommended for withdrawal from mineral entry where mineral potential is moderate or high. Domestic livestock grazing shall generally be excluded.

Vegetation would be managed according to individual site vegetative management plans and may include timber harvest. Roads would be constructed and maintained to encourage highway vehicle use commensurate with the design level of the site.

Wildfires would be vigorously controlled.

MANAGEMENT AREA 18

This would apply to an area in the vicinity of Slate Peak and Hart's Pass. The goal of the management area is to maintain the unique subalpine and alpine flora habitats.

Grazing of livestock animals would be prohibited, and pack animals would be confined to designated areas.

Collection of native plants would be prohibited. Educational signing of the local area would be encouraged.

Areas above the 5800 foot contour in the Benson Creek drainage would be recommended for withdrawal from mineral entry.

MANAGEMENT AREA 19

The emphasis would be to provide coniferous old growth habitat for wildlife. The indicator species are marten, pileated woodpecker, three-toed woodpecker, barred owl and spotted owl. This would apply to designated conifer stands.

The habitat conditions that would be provided over the long run would be 15 or more large trees per acre; 2 or more large snags per acre; 3 or more large down logs per acre; multi-storied canopy; and a specific percent overhead crown closure that varies by species type.

Access by cross-country ski trails and snowmobiling would be limited in areas of concentrated wildlife use (e.g. deer winter range). Generally, motorized vehicles would be eliminated.

MANAGEMENT AREA ACREAGE BY ALTERNATIVE

Table II-2 presents the Management Area acreages for each alternative. The enclosed alternative maps with this DEIS provide both a brief description of each management area, as well as showing its location on the forest. A description of the different management areas is presented in the previous pages. The applicable management practices, as specified by the applicable standards and guidelines, are presented in the accompanying Proposed Forest Plan.

Benchmarks are analytic tests of the quantitative outputs under different assumptions. While approximating what could be managed on the ground, they are not located geographically to assure the feasibility of managing them. Therefore, management areas are not presented for the benchmarks.

TABLE II-2

ACREAGES IN MANAGEMENT AREAS BY ALTERNATIVES
(In Thousands of Acres)

	ALTERNATIVES									
	A Current Direction	B RPA	C	D	E	F	G	G Dep	H	I
Management Area 1	246.9	388.6	0	602.6	426.3	519.4	288.5	263.7	0	0
Management Area 2	0	28.0	5.5	77.0	56.7	32.1	10.0	33.3	23.5	0
Management Area 3	77.1	85.0	0	169.4	56.3	63.3	49.3	49.3	53.8	0
Management Area 4 & 4M	131.4	133.7	297.1	0	410.5	187.4	131.4	131.4	0	403.0
Management Area 5	274.2	87.5	231.4	174.2	0	0	119.2	119.2	0	82.8
Management Area 6	0	0	87.6	0	87.6	0	0	0	0	87.6
Management Area 7	87.6	87.6	0	0	0	87.6	72.5	72.5	87.6	0
Management Area 8	0.2	4.6	1.6	0.2	0.2	0.2	4.6	4.6	4.6	4.6
Management Area 9	89.2	79.6	137.0	0	0	125.1	82.7	82.7	236.1	81.2
Management Area 10	0	0	9.3	0	0	0	15.1	15.1	9.3	0
Management Area 11	0	0	4.9	0	0	4.9	4.9	4.9	4.9	0
Management Area 12	0	0	57.0	0	0	0	78.1	78.1	174.8	0
Management Area 13	0	12.6	0	0	0	12.6	12.6	12.6	12.6	12.6
Management Area 14	0	138.6	129.6	0	0	0	131.8	131.8	398.3	277.6
Management Area 15	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2	626.2
Management Area 16	168.9	13.1	90.5	36.0	29.1	28.6	56.9	58.4	47.0	104.6
Management Area 17	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Management Area 18	0	0	0	0	0	0	0	0	0	1.7
Management Area 19	0	16.6	24.0	16.1	8.8	14.3	17.9	17.9	23.0	19.8

RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS

The following two tables (II-3a and II-3b) present the resource outputs, the environmental effects, the activities and the costs of all the alternatives and some selected benchmarks. Direct, indirect and cumulative outputs and effects are presented.

By comparing the alternatives' response to issues and concerns (Table II-1) and to outputs and effects (Table II-3a and II-3b), the tie between issues and environmental effects will be seen.

Many of the outputs and effects are derived from the analysis which is described in Appendix B. All the other environmental effects are fully discussed in Chapter IV. Consult Appendix B and Chapter IV for additional information.

Benchmark analysis is by its nature not site specific. As a result, some quantities were not estimated for benchmarks. Those are indicated in the table. The table is otherwise formatted identically to Table II-3a (Alternatives) for ease of comparison.

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

		BENCHMARKS								
OUTPUTS AND EFFECTS	Units of Measure (Average annual)	Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Developed Recreation Use	1000 RVDs									
First Decade		0	338	622	622	605	622	622	605	605
Second Decade		0	-	876	876	853	876	876	853	853
Fifth Decade		0	-	1042	1042	1012	1042	1042	1012	1012
Non-Wilderness Dispersed Recreation Use										
Roaded	1000 RVDs (without WFUDs)									
First Decade		238	336	314	303	360	322	345	324	317
Second Decade		286	-	405	368	464	365	445	416	409
Fifth Decade		402	-	598	478	684	437	657	615	601
Unroaded										
First Decade		59	95	79	101	90	108	86	81	79
Second Decade		72	-	72	122	82	157	79	74	72
Fifth Decade		100	-	66	205	76	291	73	68	67
Wilderness Use	1000 RVDs (without WFUDs)									
First Decade		44	70	44	71	50	76	65	45	44
Second Decade		53	-	53	86	61	92	78	55	53
Fifth Decade		75	-	74	120	85	128	109	76	74
Trail Construction/ Reconstruction	Miles									
First Decade		0	7	10	15	10	25	20	10	10
Second Decade		0	-	10	15	10	25	20	10	10
Fifth Decade		0	-	10	15	10	25	20	10	10
Developed Site Construction/ Reconstruction	PAOT									
First Decade		0	0	15	15	5	10	25	5	5
Second Decade		0	-	15	15	5	10	25	5	5
Fifth Decade		0	-	15	15	5	10	25	5	5

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average Annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Visual Quality Objectives										
Preservation VQO	1000 Acre	626	626	626	626	626	626	626	626	626
Retention VQO	1000 Acre	298	298	150	229	142	619	307	213	142
Partial Retention VQO	1000 Acre	289	289	123	212	113	184	302	170	113
Modification VQO	1000 Acre	414	414	678	537	693	232	395	585	693
Max Modification VQO	1000 Acre	79	79	129	102	132	45	76	112	132
Unroaded Areas Assigned to Roaded Management Prescriptions, but Which Have No Development Activities Planned for the Next 15 Years	1000 Acre	Not Estimated								
Unroaded Areas Assigned to Unroaded Management Prescriptions	1000 Acre M Acres	Not Estimated								
Wildlife and Fish Use	1000 WFUDs									
First Decade		60	98	49	104	56	76	88	112	49
Second Decade		73	-	59	126	67	92	106	136	59
Fifth Decade		101	-	82	176	94	128	148	190	83
Anadromous Fish Estimated Harvest/Habitat Capability for Harvest	1000 Pounds									
First Decade		3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1
Second Decade		3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1
Fifth Decade		3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1
Anadromous Fish Habitat Improvement	1000 Pounds of Fish									
First Decade		0	0	0	0	0	0	0	0	0
Second Decade		0	-	0	0	0	0	0	0	0
Fifth Decade		0	-	0	0	0	0	0	0	0

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Forest and RPA Indicator Species Habitat Capability										
Deer - Mule and White-tail Winter Range/ Forestwide	x 1000 Animals									
First Decade		16.5/36	16.5/36	13.0/35	14.2/35	11.9/35	14.9/36	14.5/35	16.5/36	11.9/35
Second Decade		16.5/36	-	12.2/35	12.2/35	7.8/34	12.2/35	11.6/34	16.5/36	10.1/34
Fifth Decade		20.1/36	-	7.8/33	8.7/33	7.0/32	10.1/35	9.3/32	16.5/36	8.5/32
Old Growth Mature Wildlife Forestwide	Pairs									
First Decade		3590	3590	3170	3290	3080	3360	3240	3300	3370
Second Decade		3650	-	2740	2790	2840	3140	2930	3010	2860
Fifth Decade		3850	-	2040	2100	1890	2690	2320	2590	1970
Primary Cavity Excavators Outside Wilderness/Forestwide	% Max Potent Woodpecker Pop									
First Decade		51/62	50/60	51/62	51/62	47/59	50/60	49/60	51/62	48/60
Second Decade		53/63	-	52/62	51/62	44/57	49/60	49/60	53/63	47/59
Fifth Decade		60/67	-	53/63	53/63	39/54	48/60	47/59	57/65	42/56
Fish - Anadromous and Resident Trout Forestwide	x 1000 smolts and 6" trout									
First Decade		413	413	413	413	413	413	413	413	413
Second Decade		413	-	413	413	413	413	413	413	413
Fifth Decade		413	-	413	413	413	413	413	413	413
Lynx - Forest-wide	Animals									
First Decade		43	40	52	49	61	40	40	49	57
Second Decade		38	-	44	42	65	40	40	43	65
Fifth Decade		34	-	95	95	65	40	64	97	65
Ruffed Grouse - Forestwide	Pairs									
First Decade		900	900	915	920	900	900	900	930	900
Second Decade		900	-	920	935	900	900	900	945	900
Fifth Decade		900	-	945	980	900	900	900	1025	900

OUTPUTS/EFFECTS and Units of Measure (Average annual))		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Wildlife Habitat Improvement	1000 Acre Equivalents									
First Decade		0	0	2.4	2.4	0	0	0	7.3	0
Second Decade		0	-	2.1	2.1	0	0	0	6.2	0
Fifth Decade		0	-	1.7	1.7	0	0	0	5.0	0
Range - Permitted Grazing	1000 AUMs									
First Decade		88.6	64.0	81.4	72.1	72.8	63.4	59.5	73.2	89.3
Second Decade		88.6	-	89.7	79.4	76.4	67.3	65.0	78.2	99.2
Fifth Decade		60.5	-	83.3	70.6	71.5	51.3	57.1	70.1	101.4
Improved Range Allotments	Percent									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Structural Improvements	Number									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Nonstructural Improvements	Acres									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Allowable Sale Quantity 1/	Million Board Feet									
First Decade		0	82.0	87.1	82.8	96.6	52.2	73.8	61.7	83.4
Second Decade			N/A	82.2	78.6	99.0	49.5	69.9	58.5	82.7
Fifth Decade			N/A	82.2	78.6	99.0	49.5	69.9	58.5	82.7

1/ Board foot harvest for first decade from FORPLAN. Estimates of board foot harvest for second and fifth decades calculated from FORPLAN estimates of cubic foot volumes using board foot to cubic foot conversion ratio of 4.95 from Table G-1, Regional Guide for the Pacific Northwest Region.

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Allowable Sale Quantity	Million Cubic Feet									
First Decade		0	16.4	16.7	15.9	20.0	10.0	14.1	11.8	16.7
Second Decade		Not Estimated		16.7	15.9	20.0	10.0	14.1	11.8	16.7
Fifth Decade		Not Estimated		16.7	15.9	20.0	10.0	14.1	11.8	16.7
Fuel Wood	1000 CF									
First Decade		0	800	Not Estimated						
Second Decade		0	Not Estimated							
Fifth Decade		0	Not Estimated							
Reforestation 2/	1000 Acres									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Timber Stand Improvement	1000 Acres									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Long-Term Sustained Yield Capacity	MMCF	Not Estimated		20.4	21.3	23.2	14.7	20.7	19.0	21.8
Timber Growth in Year 2030 3/	MMCF	Not Estimated		5.6	6.7	8.8	4.6	6.3	6.5	6.1
Water Yield	1000 AF									
First Decade		2315	2315	2315	2315	2315	2315	2315	2315	2315
Second Decade		2315	2315	2315	2315	2315	2315	2315	2315	2315
Fifth Decade		2315	2315	2315	2315	2315	2315	2315	2315	2315

2/ Includes reforestation by natural regeneration following treatment of slash by timber sale operators, natural regeneration following site preparation, and regeneration by planting and artificial seeding.

3/ Timber volume growth in 2030 is somewhat understated because timber yield coefficients used in FORPLAN did not reflect actual volumes that would occur more than two decades prior to CMAI in some prescriptions.

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Sediment	1000 Tons per Year									
First Decade		27.6	32.1	33.1	33.1	33.7	30.6	32.1	33.4	33.1
Second Decade		27.6	33.2	34.1	34.1	34.4	30.9	33.2	34.2	34.1
Fifth Decade		27.6	35.7	37.4	37.4	40.5	31.8	35.7	35.7	37.4
Improved Watershed Condition	Acres									
First Decade		0	0	0	3000	0	0	0	0	0
Second Decade		0	0	0	2000	0	0	0	0	0
Fifth Decade		0	0	0	0	0	0	0	0	0
Minerals	Operating Plans 4/									
First Decade		150	95	170	175	180	135	180	115	180
Second Decade		200	-	230	240	240	180	240	150	250
Fifth Decade		312	-	280	290	290	265	290	185	320
Minerals Produced 5/	Million $									
First Decade		.100	.100	.100	.100	.100	.100	.100	.100	.100
Second Decade		.500	-	.550	.600	.600	.490	.600	.350	.600
Fifth Decade		2.00	-	2.30	2.80	2.80	1.10	2.80	1.05	2.80
Fire Management Effectiveness Index	$/1000 Protected Acres									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								

4/ Includes operating plans, Notices of Intent, prospecting permits, material sales, free-use permits and leases involving locatable, leasable and saleable minerals.

5/ The values offered here are relative values based upon minerals accessibility and are not intended to be an accurate estimate of mineral production.

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Arterial and Collector Road Construction/ Reconstruction	Miles									
First Decade		0	2.0	2.4	2.4	3.3	2.4	2.4	.4	2.4
Second Decade		0	1.9	2.3	2.3	3.3	2.3	2.3	.3	2.3
Fifth Decade		0	0	0	0	0	0	0	0	0
Timber Purchaser Road Construction/Reconstruction	Miles									
First Decade		0	45.7	44.5	42.0	75.4	24.4	36.5	30.8	50.0
Second Decade		0	48.3	54.8	51.5	53.2	30.5	42.0	42.2	18.2
Fifth Decade		0	14.8	31.6	21.8	38.9	16.3	16.3	12.5	24.6
Roads Suitable for Public Use										
Passenger Car	Miles									
First Decade		988	988	988	988	988	988	988	988	988
Second Decade		494	988	988	988	988	988	988	988	988
Fifth Decade		0	988	988	988	988	988	988	988	988
High Clearance Vehicle Only	Miles									
First Decade		655	884	877	865	1032	777	838	809	905
Second Decade		1100	897	929	913	921	808	865	866	746
Fifth Decade		1100	729	813	764	850	737	737	718	778
Fuel Treatment	Acres									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Costs (Undiscounted) 6/	Million $									
First Decade		.408	9.319	11.481	11.247	18.099	7.320	10.159	8.507	14.654
Second Decade		.409		12.282	12.038	21.031	7.831	10.764	9.241	12.403
Fifth Decade		.283		16.163	15.573	19.646	9.995	13.523	10.823	15.780

6/ Benchmark cost estimates have been entirely extracted from FORPLAN data and are not be directly comparable with alternatives.

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure Average Annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Capital Investment Costs	Million $									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Total Budget										
Millions $										
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Returns to Government	Million $									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Human Resource Program	1000 Person Years									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								
Potential Changes in Jobs	Change in Number									
First Decade		Not Estimated								
Changes in Income	Change in Million $									
First Decade		-8.95	0	.75	.15	1.55	-3.25	-1.05	-2.05	.30
Payments to Counties	Million $									
First Decade		Not Estimated								
Second Decade		Not Estimated								
Fifth Decade		Not Estimated								

TABLE II-3a (Benchmarks)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS/EFFECTS and Units of Measure (Average annual)		BENCHMARKS								
		Min Lvl	Current Outputs	Max PNV Markt $	Max PNV Asgnd $	Max Timbr	Max Rdlss Rec	Max Roaded Rec	Max Wldlf	Max Range
Area Available for Specific Resources Uses 7/										
Timber Harvest	Thousand Acres	0	901.0	1080.2	1080.2	1080.2	575.6	992.6	1080.2	981.4
Grazing	Thousand Acres	Not Estimated								
Mineral Exploration	Thousand Acres	Not Estimated								
Acreages of Available Timber Harvest Prescriptions										
Clearcut 8/	Thousand Acres	0	681.1	604.4	604.4	604.4	413.7	584.5	604.4	604.4
Shelterwood 8/	Thousand Acres	0	681.1	604.4	604.4	604.4	413.7	584.5	604.4	604.4
Selective Cut 9/	Thousand Acres	0	0	98.8	98.8	98.8	67.3	95.2	98.8	0
Lands Tentatively Suitable for Timber Production	Thousand Acres	0	728.5	703.2	703.2	703.2	703.2	703.2	703.2	703.2
Lands Suitable for Timber Production	Thousand Acres	0	681.1	703.2	703.2	703.2	481.0	679.7	703.2	604.4
Lands with Timber Yield Reductions	Thousand Acres									
Full Yield		0	500.3	655.3	655.3	655.3	0	0	0	0
50% - 99% of Full Yield		0	180.8	31.8	31.8	31.8	472.2	663.6	673.3	588.3
1% - 49% of Full Yield		0	0	16.1	16.1	16.1	8.8	16.1	29.9	16.1

7/ Area available for specific resources includes both acres suitable for resource use, and unsuitable inclusions that must be crossed in order to access suitable lands.

8/ Clearcut or shelterwood prescriptions may be applied subject to specific resource objectives and opportunities identified by interdisciplinary teams during project planning.

9/ Applied to low productive lands classified as a Separate Suitability Component.

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS AND EFFECTS (Units of Measure)	ALTERNATIVES Average Annual Units									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Developed Recreation Use (1000 RVDs)										
First Decade	622	622	622	622	587	587	622	622	596	622
Second Decade	876	876	876	876	833	833	876	876	843	876
Fifth Decade	1042	1042	1042	1042	983	983	1042	1042	998	1042
Non-Wilderness Dispersed Recreation Use (1000 RVDs)										
Roaded										
First Decade	349	314	307	339	307	304	324	324	318	292
Second Decade	426	381	372	437	426	369	394	394	410	331
Fifth Decade	631	565	518	644	631	547	582	582	602	395
Unroaded										
First Decade	87	78	102	85	103	76	81	81	80	98
Second Decade	106	95	124	77	149	92	98	98	72	142
Fifth Decade	111	99	173	72	277	97	103	103	67	264
Wilderness Use (1000 RVDs)										
First Decade	65	59	72	47	72	57	61	61	44	69
Second Decade	80	71	78	57	88	69	73	73	54	83
Fifth Decade	111	99	122	80	122	96	102	102	78	116
Trail Construction/ Reconstruction (Miles)										
First Decade	15	10	25	10	40	10	30	30	10	40
Second Decade	15	10	25	10	40	10	30	30	10	40
Fifth Decade	15	10	25	10	40	10	30	30	10	40
Developed Site Construction/ Reconstruction (PAOT)										
First Decacde	10	30	20	40	10	10	20	20	10	40
Second Decade	10	30	20	40	10	10	20	20	10	40
Fifth Decade	10	30	20	40	10	10	20	20	10	40

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS AND EFFECTS (Units of Measure)	ALTERNATIVES Average Annual Units									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Visual Quality Objectives (1000 acres)										
Preservation VQO	626	626	626	626	626	626	626	626	626	626
Retention VQO	298	220	465	88	505	309	329	329	88	592
Partial Retention VQO	289	45	146	75	0	0	56	56	0	22
Modification VQO	414	685	394	770	483	648	584	584	833	391
Maximum Modification	79	130	75	147	92	123	111	111	159	75
Unroaded Areas Assigned to Roaded Management Prescriptions, but Which Have No Development Activities Planned for the Next 15 Years (M Acres)	277.1	227.9	87.9	377.0	0	122.1	220.6	217.6	353.8	6.0
Unroaded Areas Assigned to Unroaded Management Prescriptions (M Acres)	148.7	168.1	365.6	0	481.4	286.9	206.5	206.5	64.1	475.4
Wildlife and Fish Use (1000 WFUDs)										
First Decade	89	80	99	52	54	90	95	95	111	94
Second Decade	108	97	120	64	65	109	116	116	134	114
Fifth Decade	150	135	167	88	91	151	161	161	187	159
Anadromous Fish Estimated Harvest/Habitat Capability for Harvest (1000 Pounds)										
First Decade	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1
Second Decade	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1
Fifth Decade	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1	3.6/11.1

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

	ALTERNATIVES Average Annual Units									
OUTPUTS AND EFFECTS (Units of Measure)	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Anadromous Fish Habitat Improvement (1000 Pounds of Fish)										
First Decade	0	0	0	0	0	0	0	0	0	0
Second Decade	0	0	0	0	0	0	0	0	0	0
Fifth Decade	0	0	0	0	0	0	0	0	0	0
Management Indicator Species (Habitat Capability)										
Deer - Mule and White-tailed Winter Range/Forestwide (1000 animals)										
First Decade	15.2/35	15.5/35	16.5/35	13.6/35	14.9/36	13.6/35	15.5/35	15.5/35	15.5/35	16.5/36
Second Decade	14.2/35	15.5/35	16.5/35	10.1/34	10.5/35	12.7/35	15.5/35	15.5/35	14.6/35	16.5/35
Fifth Decade	9.9/34	15.2/33	16.5/34	7.8/32	9.3/35	12.7/33	17.4/33	17.4/33	16.5/33	16.5/35
Old Growth Mature Wildlife Forestwide (pairs)										
First Decade	3260	3250	3350	3130	3350	3200	3310	3240	3300	3400
Second Decade	2950	3040	3150	2840	3140	2970	3120	3010	3090	3250
Fifth Decade	2450	2410	2730	2010	2640	2160	2570	2570	2440	2930
Primary Cavity Excavators Outside Wilderness/Forestwide (% of Max. Potential Woodpecker Pops.)										
First Decade	49/60	50/60	50/60	48/60	49/60	50/60	50/60	50/60	51/62	50/60
Second Decade	47/59	49/60	51/62	47/59	48/60	49/60	50/60	50/60	51/62	50/60
Fifth Decade	44/57	48/60	51/62	43/57	44/57	48/60	50/60	50/60	54/64	51/62
Fish - Anadromous and Resident Trout - Forestwide (1000 smolts & 6" trout)										
First Decade	415	415	415	415	415	415	415	415	415	415
Second Decade	415	415	415	415	415	415	415	415	415	415
Fifth Decade	415	415	415	415	415	415	415	415	415	415

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

	ALTERNATIVES Average Annual Units									
OUTPUTS AND EFFECTS (Units of Measure)	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Lynx Forestwide (animals)										
First Decade	40	53	54	56	40	53	69	69	91	59
Second Decade	39	65	67	65	43	65	93	93	110	59
Fifth Decade	38	65	88	65	57	65	95	95	110	59
Ruffed Grouse Forestwide (pairs)										
First Decade	915	920	910	900	900	900	920	920	920	915
Second Decade	925	930	915	900	900	900	935	935	940	925
Fifth Decade	960	970	935	900	900	900	975	975	990	965
Wildlife Habitat Improvement (1000-Acre Equivalents)										
First Decade	0	2.4	7.3	0	0	0	2.4	2.4	2.4	7.3
Second Decade	0	2.1	6.2	0	0	0	2.1	2.1	2.1	6.2
Fifth Decade	0	1.7	5.0	0	0	0	1.7	1.7	1.7	5.0
Range - Permitted Grazing (1000 AUMs)										
First Decade	62.0	66.6	59.8	75.9	61.5	63.3	64.2	65.2	67.7	57.4
Second Decade	67.7	71.2	64.1	82.5	65.3	68.9	69.1	70.9	72.9	60.8
Fifth Decade	60.8	65.4	55.9	74.6	58.8	62.8	61.2	61.0	64.8	51.7
Improved Range Allotments (Percent)										
First Decade	9	10	6	16	7	11	8	10	9	5
Second Decade	Not Estimated	15	6	22	12	14	12	19	12	10
Fifth Decade	Not Estimated	13	10	18	10	11	9	9	11	8

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

	ALTERNATIVES Average Annual Units									
OUTPUTS AND EFFECTS (Units of Measure)	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Structural Improvements/Fences (Miles)										
First Decade	25	29	20	33	20	31	24	31	25	14
Second Decade	38	36	33	40	34	37	34	38	34	28
Fifth Decade	29	34	29	37	31	34	30	27	31	23
Structural Improvements/Water Developments (Number)										
First Decade	20	23	16	27	16	25	19	25	20	12
Second Decade	30	29	26	32	27	30	27	30	27	23
Fifth Decade	23	27	23	30	25	27	24	21	25	18
Nonstructural Improvements (Acres)										
First Decade	394	400	285	524	343	493	390	493	394	229
Second Decade	--	400	508	619	531	583	528	591	540	445
Fifth Decade	--	400	446	583	496	528	477	422	493	363
Allowable Sale Quantity 1/ (Million Board Feet)										
First Decade	74.4	77.8	53.4	93.9	58.9	77.5	64.2	79.8	68.8	41.5
Second Decade	62.4	75.8	51.1	91.3	56.4	75.7	61.5	61.9	66.2	39.4
Fifth Decade	50.5	75.8	51.1	91.3	56.4	75.7	61.5	54.5	66.2	39.4
Allowable Sale Quantity (Million Cubic Feet)										
First Decade	14.3	15.3	10.3	18.5	11.4	15.3	12.4	15.4	13.4	8.0
Second Decade	12.6	15.3	10.3	18.5	11.4	15.3	12.4	12.5	13.4	8.0
Fifth Decade	10.2	15.3	10.3	18.5	11.4	15.3	12.4	11.0	13.4	8.0
Fuel Wood (1000 Cubic Feet)										
First Decade	840	842	770	1,319	705	662	815	1,031	842	602
Second Decade	1,192	623	794	1,010	799	891	701	856	739	939
Fifth Decade	189	225	309	568	497	254	381	327	305	226

1/ First decade harvest in millions of board feet from FORPLAN solution. Board foot harvest for second and fifth decades calculated from FORPLAN estimates of cubic foot volumes using board foot to cubic foot conversion ratio of 4.95 from Table G-1, Regional Guide for the Pacific Northwest Region.

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

	ALTERNATIVES Average Annual Units									
OUTPUTS AND EFFECTS (Units of Measure)	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Reforestation 2/ (1000 Acres)										
First Decade	6.8	9.1	6.6	10.7	6.6	10.2	6.8	7.7	8.0	4.8
Second Decade	6.9	6.2	5.3	8.3	5.6	6.6	5.4	6.4	5.9	4.2
Fifth Decade	3.9	5.0	4.1	7.8	4.2	4.9	4.9	4.2	4.7	2.6
Timber Stand Improvement 3/ (1000 Acres)										
First Decade	3.4	3.4	2.8	3.7	2.4	3.1	3.2	3.2	3.5	2.4
Second Decade	3.6	3.6	3.3	3.7	3.1	3.5	3.5	3.5	3.7	3.2
Fifth Decade	4.9	4.0	3.7	5.1	3.4	4.9	6.0	4.0	6.7	3.7
Long-Term Sustained Yield Capacity (MMCF)	18.1	20.5	16.7	22.1	15.0	19.3	20.0	20.0	21.0	13.8
Timber Growth in Year 2030 4/ (MMCF)	5.4	8.7	5.7	9.1	5.6	8.1	7.2	6.9	7.7	5.0
Water Yield (1000 AF)										
First Decade	2315	2315	2315	2315	2315	2315	2315	2315	2315	2315
Second Decade	2315	2315	2315	2315	2315	2315	2315	2315	2315	2315
Fifth Decade	2315	2315	2315	2315	2315	2315	2315	2315	2315	2315
Sediment (Tons/Year Index)										
First Decade	32.1	33.1	31.3	33.7	30.7	34.2	32.3	32.6	33.4	30.6
Second Decade	33.2	34.1	32.0	34.4	31.0	35.0	32.9	32.8	34.2	30.9
Fifth Decade	35.3	37.4	33.3	40.5	34.2	36.7	35.4	35.1	35.7	31.8
Improved Watershed Condition (Acres)										
First Decade	0	3000	3000	0	0	0	0	0	0	0
Second Decade	0	2000	2000	0	0	0	0	0	0	0
Fifth Decade	0	1000	1000	0	0	0	0	0	0	0

2/ Includes natural regeneration following treatment of logging slash by timber sale operators, natural regeneration following site preparation, and regeneration by planting or artificial seeding.

3/ Acres of timber stand improvement during the first two decades were estimated outside of FORPLAN. No earned harvest effect results from thinning during the next two decades.

4/ Total timber volume growth in 2030 is somewhat understated because in some prescriptions timber yield coefficients used in the FORPLAN model did not reflect actual volumes that would occur more than three decades prior to CMAI.

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS AND EFFECTS (Units of Measure)	ALTERNATIVES Average Annual Units									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Minerals-Operating Plans 5/										
First Decade	150	150	130	200	135	150	170	170	170	135
Second Decade	200	200	170	260	180	200	230	230	230	180
Fifth Decade	250	250	210	320	265	250	280	280	280	235
Minerals Produced 6/ (Million $)										
First Decade	.100	.100	.100	.100	.100	.100	.100	.100	.100	.100
Second Decade	.500	.520	.355	.695	.490	.495	.570	.570	.560	.460
Fifth Decade	2.00	2.05	1.06	3.47	1.10	1.48	3.25	3.25	2.80	1.38
Arterial and Collector Road Construction/ Reconstruction (Miles)										
First Decade	2.0	3.6	.4	2.4	2.4	2.2	3.6	3.6	3.3	2.4
Second Decade	1.9	3.5	.3	2.3	2.3	2.2	3.5	3.5	3.3	2.3
Fifth Decade	0	0	0	0	0	0	0	0	0	0
Timber Purchaser Road Construction/ Reconstruction (Miles)										
First Decade	45.7	66.9	47.1	75.6	32.9	56.8	50.9	57.7	58.6	26.1
Second Decade	48.3	46.7	33.3	61.6	26.3	47.3	39.3	44.1	33.4	25.0
Fifth Decade	14.8	41.1	28.3	50.8	20.4	36.7	40.4	37.2	38.2	10.7
Roads Suitable for Public Use (Miles)										
Passenger Car 7/ (Miles)										
First Decade	988	988	988	988	988	988	988	988	988	988
Second Decade	988	988	988	988	988	988	988	988	988	988
Fifth Decade	988	988	988	988	988	988	988	988	988	988

5/ Includes operating plans, Notices of Intent, prospecting permits, material sales, free-use permits and leases involving locatable, leasable and saleable minerals.

6/ The values offered here are relative values based upon minerals accessibility and are not intended to be an accurate estimate of mineral production.

7/ The days availbable for public use would vary even though the milees do not. Alternatives with more commodity emphasis would have fewer days available for passenger car use. (Refer to Table II-1, Road Access Management)

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS AND EFFECTS (Units of Measure)	ALTERNATIVES Average Annual Units									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
High Clearance Vehicle Only (Miles)										
First Decade	884	990	891	1033	820	939	910	944	948	786
Second Decade	897	889	822	963	787	892	852	876	822	780
Fifth Decade	729	861	797	909	757	839	857	841	846	709
Fuel Treatment (1000 Acres)										
First Decade	6.6	7.7	5.2	9.9	5.1	8.6	6.1	7.4	6.5	4.0
Second Decade	13.2	8.8	9.2	15.3	10.0	12.6	9.8	11.8	10.3	7.4
Fifth Decade	7.8	9.8	7.9	12.6	8.7	9.9	8.1	7.4	8.8	6.0
Operational Costs (Million $)										
First Decade	6.0	6.6	5.1	7.5	5.2	6.5	5.6	6.5	5.9	4.3
Second Decade	6.0	6.7	5.4	7.7	5.5	6.6	5.9	6.0	6.1	4.6
Fifth Decade	5.6	6.9	5.6	8.1	5.8	7.0	6.5	5.8	6.7	4.9
Capital Investment Costs (Million $)										
First Decade	3.3	5.7	1.4	4.3	3.8	3.7	5.5	5.6	5.2	3.7
Second Decade	3.3	5.3	1.1	4.0	3.6	3.6	5.2	5.4	4.8	3.6
Fifth Decade	.3	.7	.6	.9	.4	.6	.7	.7	.6	.4
Total Budget										
(Million $)										
First Decade	9.4	12.3	6.5	11.8	9.0	10.2	11.1	12.1	11.1	8.0
Second Decade	9.2	12.0	6.4	11.6	9.1	10.2	11.1	11.4	10.9	8.2
Fifth Decade	5.9	7.6	6.2	8.9	6.3	7.6	7.2	6.4	7.3	5.3
Returns to Government (Million $)										
First Decade	4.4	4.7	3.2	5.7	3.5	4.7	3.8	4.7	4.1	2.5
Second Decade	3.9	4.7	3.2	5.7	3.5	4.7	3.8	3.8	4.1	2.5
Fifth Decade	3.1	4.7	3.2	5.7	3.5	4.7	3.8	3.4	4.1	2.5

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

OUTPUTS AND EFFECTS (Units of Measure)	ALTERNATIVES Average Annual Units									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Human Resource Program (Person Years)										
First Decade	9.3	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Second Decade	9.3	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Fifth Decade	9.3	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Potential Changes in Jobs 8/ (Change in Number)										
First Decade	0	47	-167	180	-110	41	-48	72	-23	-246
Changes in Income (Change in Total $) (Million dollars)										
First Decade	0	.45	-2.2	2.0	-1.5	.4	-.8	.8	-.45	-3.4
Payments to Counties (Million $)										
First Decade	1.1	1.2	.8	1.4	.9	1.2	.9	1.2	1.0	.6
Second Decade	1.0	1.2	.8	1.4	.9	1.2	.9	1.0	1.0	.6
Fifth Decade	.8	1.2	.8	1.4	.9	1.2	.9	.8	1.0	.6
Area Available for Specific Resources Uses 9/										
Timber Harvest (Thousand Acres)	860.8	854.1	893.5	1079.8	581.9	804.8	812.3	812.3	987.8	583.3
Grazing (Thousand Acres)	951	951	951	951	951	951	951	951	951	951
Mineral Exploration (Million Acres)	1.063	1.065	0.987	1.080	0.991	1.065	1.065	1.065	1.065	0.984

8/ Includes primary employment and secondary employment.

9/ Area available for specific resource prescriptions includes both acres suitable for specific resource management, and unsuitable inclusions which must be crossed in order to access suitable lands.

TABLE II-3a (Alternatives)

QUANTITATIVE RESOURCE OUTPUTS, ENVIRONMENTAL EFFECTS, ACTIVITIES AND COSTS BY ALTERNATIVE AND BENCHMARKS

	ALTERNATIVES Average Annual Units									
OUTPUTS AND EFFECTS (Units of Measure)	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
Acreages of Available Timber Harvest Prescriptions										
Clearcut 10/ (Acres)	561.3	563.7	476.4	604.5	419.2	524.9	541.3	541.3	583.7	420.2
Shelterwood 10/ (Acres)	561.3	563.7	476.4	604.5	419.2	524.9	541.3	541.3	583.7	420.2
Selective Cut 11/ (Acres)	91.4	91.8	77.6	98.8	62.1	85.4	88.1	88.1	95.0	0
Lands Tentatively Suitable for Timber Production (Acres)	703.2	701.2	702.2	703.2	703.2	703.2	701.2	701.2	701.2	701.2
Lands Suitable for Timber Production (Acres)	482.6	612.0	461.2	639.4	423.5	564.5	570.0	568.4	594.0	337.0
Lands with Timber Yield Reductions (Acres)										
Full Yield	227.7	370.8	165.0	536.9	414.7	440.6	302.0	300.4	442.3	0
50% - 99% of Full Yield	254.9	224.6	272.2	86.4	0	109.6	250.1	250.1	128.7	317.2
1% - 49% of Full Yield	0	16.6	24.0	16.1	8.8	14.3	17.9	17.9	23.0	19.8

10/ Clearcut or shelterwood harvest systems may be applied subject to specific resource objectives and management opportunities identified by IDT during project planning.

11/ Applied to low productive lands classified as a Separate Suitability Component.

TABLE II-3B

QUALITATIVE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS 1/

RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS	ALTERNATIVES									
	A Current Direction	B RPA	C	D	E	F	G	G Departure	H	I
Diversity	Moderate-low animal diversity. Vegetative condition of plant communities changes little.	Moderate animal diversity. Vegetative condition of plant communities changes little.	Moderate-high animal diversity. Vegetative condition of plant communities changes little.	Low animal diversity. Vegetative condition of plant communities changes little.	Same as A	Same as D	Same as C	Same as C	High animal diversity. Vegetative condition of plant communities changes little.	Same as C
Vigor of Range Vegetation (from 1983 Classification Report)	Plant vigor is high in approximately 60% of allotments in improved management systems. 40% have management systems whichain maintain moderate plant vigor	Plant vigor will improve on 15% of the allotments	Plant vigor will improve on 6% of the allotments	Plant vigor will improve on 20% of the allotments	Plant vigor will improve on 10% of the allotments	Plant vigor will improve on 12% of the allotments	Same as E	Same as E	Same as B	Plant vigor will improve on 7% of the allotments

TABLE II-3B

QUALITATIVE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS 1/

RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS	ALTERNATIVES								
	A Current Direction	B RPA	C	D	E	F	G	G Departure	H	I
Vigor of Forest Vegetation	Mixed conifer stands much more vigorous than existing. Very little change in lodgepole stands.	Mixed conifer stands somewhat more vigorous than existing. Lodgepole stands much more vigorous.	Mixed conifer and lodgepole stands somewhat improved over existing.	Mixed conifer and lodgepole stands much improved over existing.	Mixed conifer and lodgepole stands improved over existing.	Mixed conifer stands much improved over existing. Lodgepole stands somewhat improved.	Mixed conifer and lodgepole stands moderately improved over existing.	Same as G	Same as G	Mixed conifer and lodgepole stands least improved over existing.
Implications for Animal Damage and Pest Control	Moderate insect, disease and animal damage volume losses.	Lowest insect and disease volume losses. Highest animal damage volume losses.	Same as A	Same as B	Same as A	Same as B	Same as A	Same as A	Same as A	Highest insect & disease volume losses. Lowest animal damage volume losses.
Wetlands and Floodplains	About 140 acres of seasonally wet areas and floodplains per year will be harvested. Water temperature would remain at current level.	Same as A	About 95 acres of seasonally wet areas and floodplains per year would be harvested. Water temperature would be slightly lower.	About 190 acres of seasonally wet areas and floodplains are harvested each year. Water temperature would be slightly higher.	Same as D	Same as D	Same as C	Same as C	Same as C	Same as C

TABLE II-3B

QUALITATIVE RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS 1/

RESOURCE OUTPUTS AND ENVIRONMENTAL EFFECTS	ALTERNATIVES									
	A Current Direction	B RPA	C	D	E	F	G	G Departure	H	I
Influence on Small Hydro Site Feasibility	Restrictions in wilderness: Categorical exclusion, EA or EIS required in all locations	Same as A	Restrictions in wilderness: Recommend disapproval for projects proposed in North Cascade Scenic Highway	Same as A	Same as C	Same as A	Same as A	Same as A	Same as A	Same as C
Soil Compaction	Moderate potential for compaction.	Same as A	Least potential for compaction.	Highest potential for compaction.	Same as A	Same as A	Same as A	Same as A	Same as A	Same as A

1/ The reader is referred to Table II-1 for other qualitative outputs and effects which are major public issues.

ECONOMIC COMPARISON OF ALTERNATIVES

The following section summarizes the economic analysis of the alternatives. Variations in costs and benefits among the alternatives are discussed below and presented in Tables II-4, II-5, II-6 and II-7.

SIGNIFICANT DIFFERENCES IN ECONOMIC VALUES AMONG ALTERNATIVES

Present Net Value (PNV) estimates the potential economic effectiveness of management of the land and water resources of the forest of each alternative. Present Net Value is calculated by subtracting costs from the economic or priced benefits that would be produced under a planning alternative, after both costs and benefits are appropriately discounted to the present (see Appendix B, Chapter IV). PNV measures the net economic value of outputs for which dollar values are calculated. Economic costs and benefits and net economic and cash values are important components of net public benefits, the criterion used to evaluate each of the alternatives.

Differences in Present Net Values

The alternatives are ranked by decreasing PNV in Table II-4.

TABLE II-4 -- Present Net Value and Discounted Costs and Benefits of Alternatives

Alternative/ Benchmark	PNV	Change	Discounted Costs	Change	Discounted Benefits	Change
	(Million Dollars)					
A (Cur Dir) 1/	317.1		275.8		592.9	
		-11.3		-51.5		-62.8
C	305.8		224.3		530.1	
		-18.7		75.1		56.4
G (Departure)	287.1		299.4		586.5	
		-4.6		-6.1		-10.7
G	282.5		293.3		575.8	
		-4.8		16.6		11.8
H	277.7		309.9		587.6	
		-12.9		-115.8		-128.7
I	264.8		194.1		458.9	
		-4.2		229.8		225.5
D	260.6		423.9		684.4	
		-2.6		-66.7		-69.2
F	258.0		357.2		615.2	
		-8.9		-88.6		-97.6
E	249.1		268.6		517.6	
		-7.2		102.3		95.3
B	241.9		370.9		612.9	

1/ Current Direction is also a "departure" alternative.

As PNV decreases across alternatives, discounted costs and discounted economic benefits do not necessarily decrease. No general pattern is evident because changes in economic values are due to dispersed recreation, timber harvest, associated road costs, forage and developed recreation. Alternatives have different mixes of these values.

However, timber production dominates both benefits and costs. Table II-5 shows that variations in benefits and costs associated with other resources are relatively minor. For the alternatives, the economic benefits associated with timber, recreation and forage are always greater than the costs directly attributable to producing those benefits. However, because some timber and range uses may be somewhat overestimated because they may not be consumed, the net benefits may be somewhat overestimated.

TABLE II-5 -- PNV and Discounted Benefits and Costs by Resource Group by Alternative 1/

		Discounted Benefits				Discounted Costs				
Alternative	Present Net Value	Tmbr	Disp Rec	Forg	Dev Rec	Tmbr	Road 2/	Disp Rec	Forg	Dev Rec
	<------------------------(Million Dollars)------------------------>									
Alt. A (Cur Dir) 3/	317.1	343.4	213.3	20.9	15.3	236.9	17.6	11.4	7.2	2.7
Alt. C	305.8	277.4	217.7	19.7	15.3	197.4	5.5	11.9	6.8	2.7
Alt. G (Depart)	287.1	337.8	211.6	21.7	15.3	243.6	34.3	11.2	7.5	2.7
Alt. G	282.5	327.6	211.4	21.5	15.3	237.7	34.3	11.2	7.4	2.7
Alt. H	277.7	350.0	203.4	22.9	11.3	257.5	32.0	10.6	7.9	2.0
Alt. I	264.8	216.0	209.0	18.6	15.3	151.2	22.2	11.6	6.4	2.7
Alt. D	260.6	477.6	165.9	25.6	15.3	380.0	22.2	10.2	8.8	2.7
Alt. F	258.0	394.4	183.9	21.7	15.3	318.3	18.2	10.6	7.5	2.7
Alt. E	249.1	304.7	183.6	20.3	9.1	226.7	22.2	11.0	7.0	1.6
Alt. B	241.9	390.1	185.0	22.5	15.3	315.6	34.3	10.6	7.8	2.7

1/ Direct comparisons of benefits and costs by individual resource groups provide broad indications of specific relationships, but they may be misleading because many costs are not identifiable by resource area under multiple-use management.

2/ Road construction costs are included in timber costs. Costs for annual maintenance and reconstruction of arterials and collectors with capital investment funds are shown here.

3/ Current Direction is also a "departure" alternative.

In general, as timber harvests decrease, the economic costs decrease, and benefits decrease at a slower rate. Economic costs decrease by 54 percent from the alternative that most emphasizes timber to the one that least emphasizes timber. Benefits also decrease, but only by 33 percent. Costs per unit timber sold vary across alternatives and are highest in B and I and lowest in G (departure). Other resource goals of some alternatives lead to increases in the unit costs of timber production by (1) including harvests in areas of relatively low productivity and high access costs, and (2) increasing expenditures to protect nontimber resources.

The economic values displayed do not include those associated with possible future minerals production. Substantial mineral resources are known to exist on the forest, but the timing of their development and the quantities that will be extracted are highly speculative. These economic values, however, may well differ significantly among alternatives. (See Table II-3a and Chapter III, Minerals.)

Differences in Costs

On the Okanogan Forest, essentially all capital investment costs are for road construction/reconstruction and activities associated with continuous timber production. The total annual budget costs for all alternatives, except C, E and I, are higher than the average 1982 expenditure level of $9.3 million.

Alternatives that emphasize timber production have higher road and timber management costs; those that emphasize nonmarket objectives have higher recreation costs. Total road costs decrease in all alternatives after the second decade because most initial road construction and reconstruction will have been completed.

Differences in Economic Benefits and Cash Flows

Market resources include timber, livestock grazing, developed recreation, minerals and special uses for which fees are collected. The displayed economic benefits for market resources include actual dollar receipts plus additional assigned dollar values for livestock grazing and campground use. Nonmarket resource values are dollar values assigned to dispersed, wilderness and wildlife-dependent recreation. The purpose of assigning dollar values is to reflect the full economic value even though none or only part of that value associated with particular resources actually are collected as fees under current laws and policies. Economic benefits increase for the alternatives through the planning period as both timber and recreation outputs and unit prices increase.

Overall economic efficiency of alternatives can be measured by comparing economic benefits to costs. Cash receipts and costs measure actual flows to and from the U.S. Treasury and the taxpayers. On the Okanogan Forest, the major difference among both economic values and cash receipts is due to differing levels of timber production. Net cash flows for the first and fifth decades by alternative are displayed in Table II-6.

TABLE II-6 -- Average Annual Cash Flows and Noncash Benefits in the First and Fifth Decades by Alternative 1/

	Decade 1				Decade 5			
Alternative	Net Rcpts	Total Costs	Total Rcpts	Noncash Benefits to Users	Net Rcpts	Total Costs	Total Rcpts	Noncash Benefits to Users
	<---------------Million Dollars - Undiscounted--------------->							
Alt. A 2/ (Current Dir)	115.9	109.2	159.8	65.3	134.9	109.3	133.9	110.3
Alt. G (Depart)	107.4	123.6	166.2	64.8	123.4	122.1	136.1	109.4
Alt. C	103.9	78.4	115.6	66.7	143.5	97.4	128.3	112.6
Alt. D	98.6	145.0	192.7	50.9	103.7	201.5	219.5	85.8
Alt. G	96.0	104.0	135.3	64.8	124.3	137.0	152.0	109.3
Alt. H	95.5	109.1	142.3	62.3	22.3	145.3	162.5	105.2
Alt. I	89.7	68.2	93.9	64.0	123.7	85.9	101.5	108.1
Alt. E	89.2	92.0	124.9	56.3	115.2	119.7	140.0	94.9
Alt. B (RPA)	82.1	134.1	159.6	56.7	92.5	181.5	178.4	95.6
Alt. F	70.3	145.4	159.4	56.4	107.6	169.2	181.6	95.1

1/ Costs include only those of the Forest Service; receipts do not include payments to counties.

2/ Current Direction is also a "departure" alternative.

Receipts other than those from timber sales are expected to be relatively minor. Gross receipts are projected to increase over time primarily because of real stumpage price increases and increasing levels of stumpage sales. Realization of these increases is dependent upon Regional and National markets, and operation costs including labor and capital.

That portion of the economic benefits that would not be collected as cash receipts would vary slightly across alternatives. This is because noncash economic benefits are largely those associated with dispersed recreation. Dispersed recreation use would be little influenced by the selected management alternative, but the setting would be altered depending on the amount of resource development activities. The following section, Major Trade-offs Among Alternatives, discusses this by alternative. The increases in noncash benefits by the fifth decade primarily reflect anticipated increases in population.

MAJOR TRADE-OFFS AMONG ALTERNATIVES

This section summarizes the relationships among the economic values discussed above, the community effects, and the differing responses among alternatives to selected Issues, Concerns and Opportunities (ICO's) discussed in Appendix A. The purpose is to highlight major economic and noneconomic trade-offs or combinations of differences that can be quantified as indicators of response to ICO's among alternatives. However, a complete understanding of differences among alternatives requires reading all of this chapter and Chapter IV.

To provide a partial framework for assessing these trade-offs, the long-term resource demands or needs of the nation, region and local communities are briefly summarized. Then selected economic values and quantified indicators of responsiveness to major ICO's are tabulated. Finally, differences and similarities among individual alternatives are summarized in terms of major trade-offs among competing objectives or responses to expressed public issues, management concerns or resource use and development opportunities.

National, Regional and Local Overview

National (RPA) planning estimates that total national demands will rise for all outputs of the National Forests. At the same time, there is a strong demand to protect and enhance the quality of the environment. Demands and prices for commodity production are generally determined in national markets and the nation benefits most when supplies are provided from the most efficient sources of production. The Okanogan National Forest is an efficient supply source for timber. In contrast, the economic benefits associated with the production of forage for domestic livestock are generally less than the cost of production.

Demands for outdoor recreation uses are essentially local and regional. Recreationists on the Okanogan Forest come from thoughout the State of Washington with most users from the Seattle/Puget Sound area. Recreation use of the forest is expected to increase in the next two decades (Washington State Outdoor Recreation Plan for Districts 3 and 7). Beyond that, recreation demand is expected to increase not only as a function of population, but also as use on adjoining areas is displaced by other resource activities.

In Okanogan County, employment and income levels are dominated in descending order of importance by services, government, trade and forest products manufacturing. Unemployment rates have been high in Okanogan County; in 1984 the unemployment rate was 17.1 percent.

Economic Values and Responses to Major Issues, Concerns and Resource Use and Development Opportunities

The major reason that alternatives differ is that each responds to the issues, concerns and resource use and development opportunities (ICO's) identified for the Okanogan Forest in different ways. This section summarizes many of these differences in responses by defining indicators of those responses that can be quantified. It also discusses indicators of central concern to the nation as a whole, as owner of this forest. Seven issues and national concerns with great influence on the alternatives and indicators of responsiveness include:

1. The level of timber harvest while responding to other demands. Indicators:

   - volume of timber harvested
   - long-term sustained yield capacity
   - suitable acres available for timber production

2. Areas to be managed as roadless areas while meeting other demands. Indicators:

   - acres of roadless areas

3. Quality of habitats and wildlife and fish populations. Indicators:

   - acres of mixed conifer old growth habitat
   - population of deer

4. Contribution of the forest to the economic development and way of life of nearby communities. Although no quantitative indicators reflecting ways of life are available, Table II-7 displays the implications of the alternatives. Indicators of contribution to economic development:

   - number of forest-dependent jobs
   - dollar income generated in dependent communities
   - payments to counties

5. Resolution of conflicts between developed and dispersed recreation demands and other resource needs. Indicators:

   - recreation visitor days for developed sites, roaded areas and unroaded areas
   - acres of visual quality objective, Retention
   - acres of visual quality objective, Partial Retention

6. Areas to be accessed for mineral development. Indicators:

   - road access on high probability mineral areas

7. Rivers to be classified as wild and scenic. Indicators:

   - Percent rivers inventoried as classification maintained

In addition, the nation as a whole has an interest in ensuring that the Okanogan National Forest is managed in a financially prudent manner while the quality of the physical environment is protected and enhanced. Indicators of national interest:

- net economic value, as measured by present net value
- net cash flow
- noncash economic benefits

In Table II-7, the indicators identified above are used to suggest the degree of response of each alternative to these ICO's. Other displays in Chapter II and discussions in Chapter IV and Appendix B Chapter III provide more detailed information about specific effects and trade-offs.

The amount of land that is suitable for timber production varies greatly between the alternatives. Table II-8, displays these differences. Of 1,487,300 acres of forested lands, about 47% are tentatively suitable for timber production. Following subtraction of tentatively suitable forest lands managed for resources not compatible with timber harvest, lands where management direction precludes timber production (SSC lands in Alternative I), or lands where timber harvesting would be too expensive, only 23% to 43% of forested lands are suitable for timber production. Of all forested lands, suitable lands capable of producing 20 cubic feet per acre CMAI comprise between 23% and 39% of the total.

TABLE II-7 -- Quantitative Indicators of Responsiveness of Alternatives to Major Issues and National Concerns

		Timber Issues						Wildlife Issues		Community Effects Issues 3/		
											% Change Jobs 4/ and Income 1st Decade %	
ALTERNATIVES	PNV $ Million	Decades 1/5 Average per Year Net Receipts $ Million	Noncash Benefits $ Million	First Decade Harvest Avg/Ann MMBF	LTSYC MMCF/ decade	Suit Avail Timber Lands M Acres	Roadlss Areas M Acres	Old 1/ Growth 1st/5th M Acres	Deer 2/ by Decade 1st/5th M Nos.	Payments to County Change 1st Decade $ Million	Jobs	Income
A (Cur Dir)	317.1	11.6/13.5	6.5/11.0	74.4	181.2	482.6	148.7	33/23	15.2/ 9.9	0	0	0
C	305.8	10.4/14.4	6.7/11.3	53.4	166.6	461.2	365.6	49/42	16.5/16.5	-.3	-29	-28
G (Depart)	287.1	10.7/12.3	6.5/10.9	79.8	199.9	568.4	206.5	44/34	15.5/17.4	.1	13	10
G	282.5	9.6/12.4	6.5/10.9	64.2	200.0	570.0	206.5	47/34	15.5/17.4	-.2	- 8	-10
H	277.7	9.6/12.2	6.2/10.5	68.8	209.8	594.0	64.1	47/41	15.5/16.5	-.1	- 4	- 6
I	264.8	9.0/12.4	6.4/10.8	41.5	137.7	337.0	475.4	49/49	16.5/16.5	-.5	-43	42
D	260.6	9.9/10.4	5.1/ 8.6	93.9	220.8	639.4	0	44/31	13.6/ 7.8	.3	31	25
F	258.0	7.0/10.8	5.6/ 9.5	77.5	192.8	564.5	286.9	44/32	13.6/12.7	.1	7	5
E	249.1	8.9/11.5	5.6/ 9.5	58.9	149.7	423.5	481.4	44/39	14.9/ 9.3	-.2	-19	-19
B	241.9	8.2/ 9.2	5.7/ 9.6	77.8	205.2	612.0	168.1	43/34	15.5/15.2	.1	8	6

1/ Mixed Conifer outside Wilderness

2/ Deer Winter Range Habitat Capability

3/ Increase and Change from A

4/ Jobs include primary and secondary employment

5/ Without WFUDs

6/ Includes high and medium-high mineral potential areas withdrawn or recommended for withdrawal or having high access restrictions (see Chapter IV, Table IV-7).

TABLE II-7 -- Quantitative Indicators of Responsiveness of Alternatives to Major Issues and National Concerns

	Recreation Issues						Mineral Issues
				Visual Quality Level			
ALTERNATIVES	Developed	Roaded 5/	Unroaded 5/	Retention	Partial Retention	Wild and Scenic Rivers % Inventoried Classification Maintained	Acres of High Mineral Probability Having High Access Restrictions (M Acres)6/
	1st/5th Decades M Recreation Visitor Days			M Acres	M Acres		
A (Cur Dir)	622/1042	349/631	85/108	298	289	98	171.6
C	622/1042	307/518	102/173	465	146	100	219.9
G (Depart)	622/1042	324/582	81/103	329	56	95	144.3
G	622/1042	324/582	81/103	329	56	95	144.3
H	596/ 998	318/602	80/ 67	88	0	65	137.8
I	622/1042	292/395	98/264	592	22	100	209.2
D	622/1042	339/644	85/ 72	88	75	75	90.1
F	587/ 983	304/369	76/ 97	309	0	74	173.1
E	587/ 983	307/415	103/277	505	0	79	205.0
B	622/1042	314/565	78/ 99	220	45	88	171.0

TABLE II-8

ACRES OF NATIONAL FOREST LAND CAPABLE, AVAILABLE AND SUITABLE FOR TIMBER PRODUCTION

LAND CLASSIFICATION	ALTERNATIVES									
	A Current Direct.	B RPA	C	D	E	F	G	G Dep	H	I
	Thousands of Acres									
1. Non-forest (includes water)	218.9	218.9	218.9	218.9	218.9	218.9	218.9	218.9	218.9	218.9
2. Forest Land	1487.3	1487.3	1487.3	1487.3	1487.3	1487.3	1487.3	1487.3	1487.3	1487.3
3. Forest Land Withdrawn from Timber Production	529.3	531.3	530.3	529.3	529.3	529.3	531.3	531.3	531.3	531.3
4. Forest Land Incapable of Producing Crops of Industrial Wood	0	0	0	0	0	0	0	0	0	0
5. Forest Land Physically Unsuitable:										
-Irreversible Damage Likely	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8	12.8
-Not Restockable in 5 Years	242.0	242.0	242.0	242.0	242.0	242.0	242.0	242.0	242.0	242.0
6. Tentatively Suitable Forest Land (Item 2 minus Items 3, 4, 5)	703.2	701.2	702.2	703.2	703.2	703.2	701.2	701.2	701.2	701.2
7. Forest Land Not Appropriate for Timber Production 1/	220.6	89.2	241.0	63.8	279.7	138.7	131.2	132.8	107.2	364.2
8. Unsuitable Forest Land (Items 3, 4, 5 and 7)	1004.7	875.3	1026.1	847.9	1063.8	922.8	917.3	918.9	893.3	1150.3
9. Total Suitable Forest Land (Item 6 minus Item 7)	482.6	612.0	461.2	639.4	423.5	564.5	570.0	568.4	594.0	337.0
10. Forest Land - Less Adequate Information 2/	37.2	64.4	33.9	60.1	34.5	54.4	61.5	61.5	62.6	0 3/
11. Suitable Forest Land Excluding Separate Suitability Component (Item 9 minus Item 10)	445.4	547.6	427.3	579.3	389.0	510.1	508.5	506.9	531.4	337.0
12. Total National Forest Land (Item 1 plus Item 2)	1706.2	1706.2	1706.2	1706.2	1706.2	1706.2	1706.2	1706.2	1706.2	1706.2

1/ Includes lands not appropriate for timber production due to multiple-use objectives and cost efficiency.

2/ Lands identified as a Separate Suitability Component. Suitable forest lands not capable of producing 20 cubic feet per acre CMAI, for which the quality of knowledge and understanding regarding response to timber management is less than on more productive lands.

3/ Management direction would prohibit timber harvest on low productivity lands identified as a Separate Suitability Component in this alternative.

Differences and Similarities of Individual Alternatives

Alternative A (Current Direction)

Alternative A has the highest PNV of the alternatives, because timber activities are concentrated in the most valuable timber types. Further, the noncash value of dispersed recreation use this alternative would provide is quite high.

Timber accessibility, harvest scheduling (departure) and species mix contribute to the high timber value.

For Alternative A, harvests are concentrated in more valuable timber, in earlier time periods. By departing from non-declining yield, current harvest and current values are maximized. Therefore, these high values, though discounted somewhat, remain high because they occur so early in the planning period. This alternative has fewer acres of non-stocked lands in need of regeneration in the first decades, so costs are lower.

Lodgepole pine stands, which are of low value and have higher road and logging costs per unit, are harvested at a very low level. Road costs are relatively low in this alternative because roads are not needed to access lodgepole pine stands.

Developed recreation, dispersed recreation and visual quality objectives are emphasized in this alternative. Only Alternative C has higher dispersed recreation values.

Average annual net returns are $11.6 million in the first decade and rise to $13.5 million in the fifth decade. High timber harvests would lead to a large contribution to community employment and income and high cash payments to the county.

Alternative C

This alternative is second to Alternative A in PNV. It differs chiefly because of its emphasis on amenities and low level of timber harvest.

Lodgepole pine, a low value species, is a major component of the timber harvested. Also, the timber produced is often tightly constrained for amenities, particularly wildlife and visual objectives. Therefore, the timber that is produced is at a higher cost. More acres of nonstocked land need to be regenerated in this alternative than A, so costs for this are higher.

Harvests are concentrated on gentle ground; moderate, steep and roadless areas are avoided. Timber harvesting costs are relatively low because activities take place on gentle slopes (lower logging costs) and in higher valued stands.

Dispersed recreation, developed recreation, visual quality objectives and wildlife are emphasized in this alternative. The benefits generated from the amenity resource groups have the highest value of all alternatives.

Net cash receipts would be $10.4 million in the first decade and increase to $14.4 million in the fifth decade. The low timber harvest would lead to about 29 percent fewer jobs and reduced income to the community. Payments to the county would decrease by $300,000.

Alternative G (Departure)

Alternative G (departure) is ranked third for PNV. Discounted benefits are less than A; discounted costs are higher. Alternative G (departure) departs from non-declining yield, so current harvest and values are maximized early. Discounted values remain high because of the short discounted period.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative G (departure) has a significantly larger investment in arterial and collector road systems in the first two decades. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. More lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Overall, timber benefits are slightly less: Alternative G (departure) harvests more volume than A, but enters the lower value lodgepole pine stands. Recreation benefits are slightly lower than A, because visual constraints are relaxed, but still very high. Hunting in the Methow Valley contributes significantly to the large number of recreation visitor days (RVD's).

Average annual net returns are $10.7 million in the first decade and rise to $12.3 million in the fifth decade. The large timber harvest and road investment program would significantly contribute to community stability. Jobs would increase by 13 percent and income by 10 percent in the first decade. After that, a reduction is expected because of the decline in yield in future decades. Payments to the county would increase by $100,000 in the first decade.

Alternative G

Alternative G is ranked fourth in terms of PNV. Discounted benefits are lower and costs are higher than Alternative A. Alternative G has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative G has a significantly larger investment in arterial and collector road systems in the first two decades. Road standards are higher in this alternative because of the high timber and recreation use. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. About seven times as many acres of lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Timber benefits are less because Alternative G harvests less volume than A and enters the lower value lodgepole pine stands. Recreation benefits are slightly lower than A, because visual constraints are relaxed and RVD's are of lower value, but overall, recreation benefits are still very high.

Average annual net returns are $9.6 million in the first decade and rise to $12.4 million in the fifth decade. The reduced timber harvest would adversely affect community stability. Jobs would decrease by 8 percent and income by 10 percent in the first decade. Payments to the county would decrease by $200,000.

Alternative H

Alternative H is ranked fifth in terms of PNV. Discounted benefits are lower and costs are higher than Alternative A. Alternative H has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Road costs, logging costs and species mix contribute to overall higher costs than Alternative A. Alternative H has a significantly larger investment in arterial and collector road systems in the first two decades. Virtually all the roadless areas would be entered, so road costs would be high. Logging costs are higher because moderate to steep ground and unroaded areas are accessed. Twice as many acres of nonstocked lands need to be regenerated as opposed to A and precommercial thinning investments are higher. About ten times as many lodgepole pine stands, which are associated with lower values and higher costs, are harvested.

Discounted benefits are less than A. Timber benefits are less because Alternative H harvests less volume than A and enters the lower value lodgepole pine stands in the first decade. Over the long run, timber value would be higher than Alternative A, because Alternative H remains constant in terms of timber harvest volume, and Alternative A declines after the first decade. Dispersed recreation values are lower than A because of so much roaded area.

Average annual net returns are $9.6 million in the first decade and rise to $12.2 million in the fifth decade. The reduced timber harvest would adversely affect the economic community. Jobs would decrease 4 percent and income 6 percent in the first decade. Payments to the county would decrease by $100,000.

Alternative I

Alternative I is ranked sixth in terms of PNV. Discounted benefits and costs are lower than Alternative A. Alternative I has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are less than Alternative A, because timber harvest is so low. But road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative I has a larger investment in arterial and collector road systems in the first two decades. All roadless areas would remain unroaded. Arterial and collector road costs are higher because activities are concentrated in the remaining roaded areas. Timber volume is the lowest in this alternative, though the timber harvested has relatively high value. Unit costs are very high because of the many amenity objectives, such as wildlife and recreation.

Discounted benefits are less than A. Timber benefits are less because Alternative I harvests less volume than A and enters the lower value lodgepole pine stands in the first decade. Dispersed recreation values are slightly less than Alternative A, though still very high. Recreation volume is reduced somewhat, but is valued highly because of so much unroaded area.

Average annual net returns are $9.0 million in the first decade and rise to $12.4 million in the fifth decade. The reduced timber harvest would significantly adversely affect the economic community. Jobs would decrease 43 percent and income 42 percent in the first decade. County receipts would decrease by $500,000.

Alternative D

Alternative D is ranked seventh in terms of PNV. Discounted benefits are higher than Alternative A, but more than offset by the greater increase in costs. Alternative D has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are much higher than Alternative A, because timber harvest is so high. Road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative D has a larger investment in arterial and collector road systems in the first two decades. Entering the roadless areas requires more local road construction and reconstruction. Logging costs are high because three times as many acres of nonstocked lands need to be regenerated, eight times as many lodgepole pine acres are harvested, and a greater investment is required for precommercial thinning.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation use is high, but values are the lowest because so much of the area is roaded. Also, because of the high timber harvest, forage values increase in this alternative, the highest of all alternatives.

Average annual net returns are $9.9 million in the first decade and increase slightly to $10.4 million in the fifth decade. The increase timber harvest would significantly affect the economic community. Jobs would increase 31 percent and income 25 percent in the first decade. County receipts would increase the most, by $300,000.

Alternative F

Alternative F is ranked eighth in terms of PNV. Discounted costs and benefits are greater than Alternative A. Alternative F has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Discounted costs are higher than Alternative A because timber volume harvest and its associated costs are higher. Costs would be greater because some roadless areas would be entered, more cable and helicopter ground would be logged, and deer winter range and other habitat objectives would be constraining.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation values are lower because of the altered state of the land, i.e. more roaded areas.

Average annual net returns are $7.0 million in the first decade and increase to $10.5 million in the fifth decade. The increased timber harvest would slightly affect the economic community. Jobs would decrease 7 percent and income 5 percent in the first decade. County receipts would increase slightly, $100,000.

Alternative E

Alternative E is ranked ninth in terms of PNV. Discounted costs are slightly lower and benefits much less than Alternative A. Alternative E has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are lower than Alternative A, because timber harvest is lower. Road costs, logging costs and species mix contribute to higher per unit costs than Alternative A. Alternative E has a larger investment in arterial and collector road systems in the first two decades than A. Across alternatives, road costs are relatively low because no roadless areas would be entered, and roads would be built and maintained for a single use. Unit management costs are higher because Alternative E has proportionally more acres of (high logging cost) steep ground. Therefore, higher thinning, reforestation and harvest costs would result.

The acres managed for intensive timber management would have very rapid turnover and high growth per acre. Future trees would not contribute as much value. Logging costs are high because two to three times as many lodgepole pine acres are harvested.

Discounted benefits are lower than Alternative A, because less timber is harvested in this alternative. Dispersed recreation values are lower because so much of it is in an altered state outside the roadless areas. Wildlife and fish user days would also decrease because of the altered environment outside the roadless areas and the increase in roadless areas. Developed recreation benefits are the lowest of any alternative.

Average annual net returns are $8.9 million in the first decade and increase to $11.5 million in the fifth decade. The decreased timber harvest would affect the economic community. Jobs would decrease 19 percent and income 19 percent in the first decade. County receipts would decrease by $200,000.

Alternative B

Alternative B is ranked tenth in terms of PNV. Discounted benefits and costs are higher than Alternative A. Alternative B has a non-declining yield schedule, so the effects of discounting are evident. The higher values occur in the future, not necessarily in the first decade, so values are discounted longer and PNV is less.

Overall, discounted costs are higher than Alternative A, because timber harvest is higher. Road costs, logging costs and species mix contribute to higher per unit costs and overall costs than Alternative A. Alternative B has a larger investment in arterial and collector road systems in the first two decades. Steeper ground and unroaded areas would be accessed. Also, more demands would be made on roads because of the conflict of use and mixed traffic. Logging costs are high because three times as many acres of nonstocked lands need to be regenerated, nine times as many lodgepole pine acres are harvested, proportionately more steep ground is harvested and a greater investment is required for precommercial thinning.

Discounted benefits are higher than Alternative A, because more timber is harvested in this alternative. Dispersed recreation values are lower because so much of the area is roaded.

Average annual net returns are $8.2 million in the first decade and increase slightly to $9.2 million in the fifth decade. The increased timber harvest would affect the economic community. Jobs would increase 8 percent and income 6 percent in the first decade. County receipts would increase by $100,000.

Chapter III

AFFECTED ENVIRONMENT

OVERVIEW

This chapter is organized to describe the physical, biological, economic and social components of the planning area that would be affected by implementing any of the alternatives. The potential of the Okanogan National Forest to resolve public issues, management concerns and resource opportunities is addressed through discussions of projected resource supply and demand.

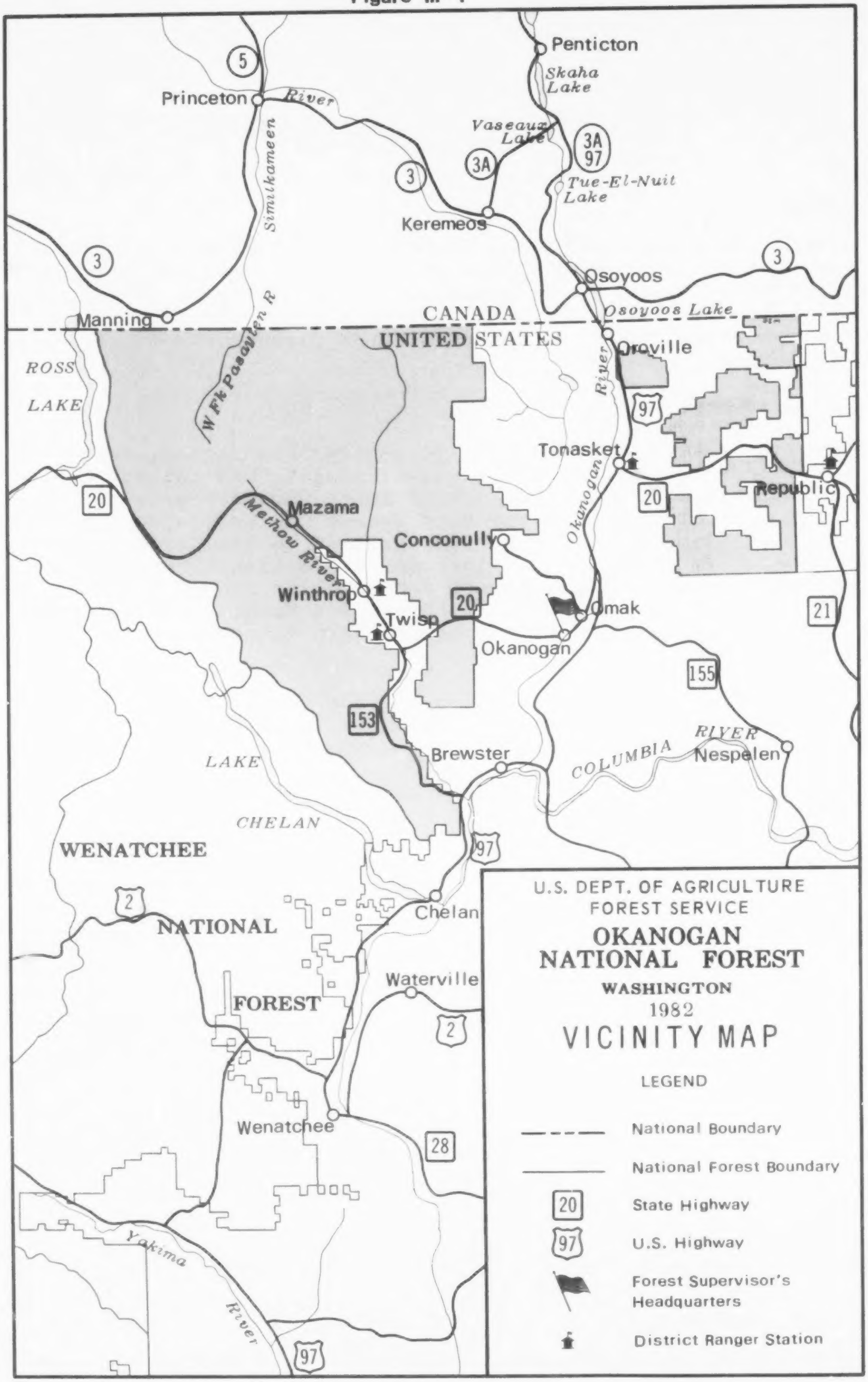
LOCATION OF PLANNING AREA

The planning area is located in North Central Washington, occupying 1,706,200 acres in portions of Okanogan, Skagit, Whatcom and Chelan Counties. It extends from the International Boundary with the Province of British Columbia south to the Methow-Lake Chelan Divide, and from the North Cascades National Park Complex east to the Okanogan and Ferry County line. The planning area includes all National Forest lands within the Okanogan National Forest Proclamation Boundary and those lands listed as Wenatchee National Forest and Mount Baker National Forest presently administered by the Okanogan National Forest (see Figure III-1, next page).

The Okanogan National Forest is reached from the north and south by U.S. Highway 97, and from the east and west by Interstate 90, U.S. Highway 2 and State Highway 20.

The biophysical area of influence is considered to be the area administered by the Okanogan National Forest, while the socio-economic area of influence is considered to be Okanogan County. About 70 percent of Okanogan County is under either public or Colville Confederated Tribe control. The Forest Service administers about 45 percent of the county land area and over 80 percent of the Methow Valley.

Figure III-1



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LEGEND
National Boundary
National Forest Boundary
State Highway
U.S. Highway
Forest Supervisor's Headquarters
District Ranger Station

PHYSICAL ENVIRONMENT

The components of the physical environment that could be affected by the alternatives area: microclimate, water, soils, minerals and energy resources, air quality, fire, lands, roads, utility corridors, wilderness and roadless areas. To gain an understanding of the affected components of the physical environment, it is important to understand two other non-affected components: topography and climate.

TOPOGRAPHY

Glaciation has played an important role in molding the surface features of the National Forest. The northern Cascades consist of precipitous mountain peaks ranging up to 9,000 feet elevation separated by U-shaped valleys of glacial origin; steep, rugged topography is characteristic.

The Okanogan Highlands provide a sharp contrast to the ruggedness of the North Cascades. The Highlands were overridden by continental glaciation, resulting in moderate to gentle topography. Broad, rounded mountains to 7,200 feet elevation occur.

CLIMATE

The National Forest includes the Okanogan Highlands and both the eastern and western slopes of the North Cascade Range. The climate varies from the near desert conditions east of the Cascades at Alta Coulee to a cool, moist maritime type along the Cascade Crest. The National Forest possesses climate of both maritime and continental characteristics. This is because the high ridges of the Cascades intercept prevailing westerly winds and disrupt the path of Pacific storm systems. Topography and distance from the ocean influence the local climatic regime. Precipitation is greatest and temperatures are more moderate west of the Crest. Average annual precipitation on the west slopes ranges from 60 inches near Ross Lake to 80 inches west of Rainy Pass. Precipitation declines rapidly eastward from the Crest to about 10 inches near Alta Lake.

MICROCLIMATE

Microclimate is is the climatic conditions of a specific location, usually considered within one meter of the ground surface. Microclimate influences soil, water and vegetation occurrence and eventually the location and extent of the other resources found on the forest. Variation between sites may be great, even within short distances of specific locations.

Microclimate on the Okanogan National Forest varies from hot and extrememly dry to very cool and wet. Steep, south aspects tend to be the dry, hot sites. North and east aspects at the higher elvations tend to be the cool and wet sites. Springs or depressions tend to increase water content further influencing the soil and vegetation occurrence. Microclimate grades from each extreme to different site conditions as elevation, aspect, slope gradient, wind conditions, vegetation condition, soil-water conditions and influence from surounding topography interact to create many microsites.

WATER

Water is an important resource that helps support the economy of the Okanogan and Methow valleys. Water is a limiting factor in expanding agricultural industries because summer flows are low. Runoff is high quality, and the trends are steady, based on water quality data collected on the Okanogan National Forest (1979-1982). Water quality is suitable for current uses.

Waters on the Okanogan National Forest are placed in "Class AA" (Extraordinary) by the Washington State Department of Ecology, which is the highest quality classification used.

SUPPLY POTENTIAL

Runoff from the National Forest contributes to the two major river systems, the Columbia and the Skagit. Rivers that flow from the National Forest into the Columbia include the Methow, Okanogan and San Poil. Average annual runoff from the Okanogan National Forest is shown in Table III-1.

TABLE III-1
AVERAGE RUNOFF FROM OKANOGAN NF

Major Areas	Runoff (acre-feet)
East of Cascade Crest into Columbia River	1,715,000
West of Cascade Crest into Skagit River	600,000
Total from Okanogan NF	2,315,000

Forest runoff into the Columbia River represents about 4 percent of its flow at Wells Dam. Runoff from the west side of the Cascade Crest constitutes about 20 percent of the flow of the Skagit River at Diablo Dam. About 300,000 acre-feet per year flows into Canada from the Pasayten and Ashnola rivers, but flows into the Columbia River via the Similkameen River and the Okanogan River.

Runoff is characterized by low summer, fall and winter flows and high spring flows. Many small creeks dry up each year during August and September. During extended dry summers, portions of the Methow River have no surface flow. Diversions are not known to commonly dewater streams, but this could occur during infrequent, extended drought periods. Water use is planned around normal low summer streamflows.

High spring flows originate from snow melt. Approximately 50 to 70 percent of total annual flow occurs in May and June, although summer thundershowers or winter rain-on-snow events can create short-term peak flows larger than annual spring snow melt. Annual runoff varies from almost five feet per acre at high elevations to less than one-half foot per acre at the lowest elevations.

CURRENT USES

Agricultural irrigation and downstream electrical generation are the primary uses of water flowing from the Okanogan National Forest, although recreational uses are increasing. Presently, 32,400 acres and 14,000 acres are irrigated in the Okanogan and Methow Basins, respectively. Several hydroelectric dams are located downstream from the forest on the Columbia and Skagit Rivers.

About 165,000 acre-feet of irrigation water is diverted each year. About 20% is lost by seepage from unlined canals. About 130,000 acre-feet is used each year for irrigation. At $10 per acre-foot, the value of diverted irrigation water is $1.65 million per year. Approximately 2.15 million acre-feet of water leave the forest each year. This water goes through nine hydroelectric dams on its way to the Pacific Ocean. The estimated value of one acre-foot of water for hydropower production is $.67 for an annual value of $1.44 million. Domestic water use is a very small part of the total water production on the Okanogan National Forest. Total annual value of water produced on the Okanogan National Forest is $3.09 million. No substantial municipal supplies are from surface water runoff.

Range allotments on the National Forest require water to sustain and distribute livestock. Water developments generally consist of springs diverted to tanks or ponds. Nearly 600 of these sites are currently developed.

Only isolated instances of domestic use of surface water occur. There are no designated municipal watersheds on the forest, although limited surface water is withdrawn for domestic use. The towns get water from wells. The isolated users of surface water don't need to notify the Forest Service of the water use because it is controlled by the state and often the water is withdrawn on land other than national forest system lands.

DEMAND

Demand for high quality water increases as local populations increase. Some streams in the Methow and Okanogan basins are closed to further water right appropriations. In addition, approximately 20,000 acres in the Okanogan Valley are presently not irrigated that are potentially irrigable (Kauffman 1976 and 1977).

Approximately 80,000 additional acre-feet of storage would be required to meet all potential irrigation demands (Soil Conservation Service 1980).

The State of Washington, Department of Ecology completed Water Resources Management Programs for the Okanogan and Methow River Basins in 1976 and 1977 (Kauffman 1976 and 1977). The Okanogan River Basin plan was revised in 1984. The main conclusions from these studies are: (1) water is available for further appropriation, but a firm water supply during low flow is not available without associated storage; (2) in the

Okanogan Basin, the state should continue to work towards achieving environmentally sound multipurpose storage; (3) some streams in both basins are closed to further appropriation; and (4) water rights granted in the Methow and Okanogan Rivers after 1977 are subject to minimum stream flows established by the Washington State Department of Ecology. Water uses will be interupted if the Rivers fall below established minimum flows, as happened in 1985.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The State of Washington's Water Resources Act of 1971 states that "perennial rivers and streams be retained with base flows necessary to provide for preservation of wildlife, fish, aesthetic and other environmental values and other navigational values" (Chapter 90.54 RCW). Also, lakes and ponds are to be retained substantially in their natural condition.

Best management practice (BMP) concepts have been developed by the state to insure protection of water sources against degradation by non-point pollution activities such as timber harvest.

Best management practice is a practice or combination of practices determined through problem assessment, examination of alternative practices, and appropriate public participation to be the best, practicable (including technological, economic and institutional considerations) way to prevent or reduce pollution from non-point sources to acceptable water quality goals. Non-point sources of pollution come from a large areas and can not be traced to a single point of origin or discharge.

Forest Service management practices which follow current Forest Service policy and regulations have been determined to meet or exceed the state's BMP concept in maintaining water quality in the Memorandum of Understanding (USDA 1979, and Washington State 1978).

OPPORTUNITIES

Existing runoff represents the natural capacity for annual waterflow from the National Forest. Development of storage reservoirs is the best way to create adaquate irrigation water supplies. Several sites were identified as suitable for impoundment development (U.S. Geologic Survey). Developments are not constructed by the Forest Service. The Forest Service oversees any development on National Forest System Lands.

SOILS

Soils on the Okanogan National Forest are derived from granitic glacial till, volcanic ash or pumice and residual bedrock. Soils are generally coarse textured. Sandy loams often are composed of volcanic ash. Coarser textured soils have little ash and are composed of glacial till. Residual soils are shallow and contain 50%-80% rock.

Generally, soils have low to moderate erosion hazards and would be considered stable. Very rapid soil infiltration rates reduce water concentration which causes mass failures or rills and gullies. This reduces the potential for on-site and off-site impacts. These physical characteristics, along with a general lack of horizon development, allow water to move freely through the soil.

Although generally not a problem, some soils have a high potential for accelerated mass or surface erosion. These are shallow soils resting on hard, unweathered, unfractured bedrock on oversteepened slopes. Water quickly saturates the soil profile because it can not move through the bedrock. The increased soil water content reduces cohesion between soil particles and soil movement occurs. Sediment from surface erosion or mass failure causes damage off-site as well as reduces the soil resource on-site.

SUPPLY POTENTIAL

Inherent soil fertility is generally low. Soil parent material contains only small amounts of necessary soil nutrients. The dry climate does not generate large amounts of annual vegetative growth. Little organic matter is incorporated into the soil. Most organic matter is located in the upper 2-6 inches of the soil profile. Practices that disturb the surface soil and destroy or cause major displacement of the organic matter can reduce inherent soil fertility.

A detailed description of soils and their characteristics are contained in the Okanogan National Forest Soil Resource Inventory (1977).

CURRENT USES

Soil is the basic resource that supplies water and nutrients for vegetation which supplies habitat for wildlife and resources for people's use.

DEMAND

There are needs and requirements to protect the soil resource. The Multiple-Use Sustained Yield Act of 1960 requires that soil productivity be maintained and not diminished.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The U.S. Soil Conservation Service plans to eventually place the soils of the Okanogan National Forest within the National Comprehensive Soil Classification. None of the proposed alternatives will alter the ability of the soil to be classified.

OPPORTUNITIES

Soil resource improvement opportunities consist mostly of grass seeding to control erosion on logging skid trails, landings and access roads.

Compacted soils can be improved through ripping or disking the soils through the compacted soil depth. Burrowing animals such as gophers may also reduce the extent of compacted soils, but the animals may cause more damage and reduction of vegetative growth than they improve. Mechancial ripping is often used to reduce soil compaction while burrowing animals are not used.

MINERALS

Minerals

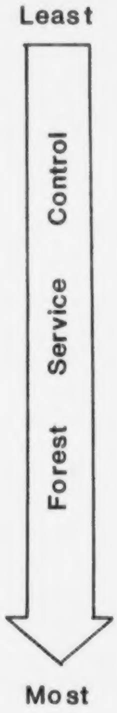
U.S. mining laws classify mineral commodities into three distinct groups: locatables, leasables and salables. The manner in which each is disposed and the Forest Service's authority to control the exploration for and development of each commodity varies considerably (Figure III-2, FSH 2809.11).

The Okanogan National Forest offers some of the highest locatable mineral potential of any Forest in the Northwest Region. Conversely, nearly 40 percent of this land is withdrawn from mineral exploration and development. Metals currently or potentially produced include antimony, copper, gold, iron, lead, molybdenum, silver, tungsten and zinc. Uranium is the only energy mineral for which interest in development has been expressed on the Forest.

Salable minerals use on the Okanogan National Forest has averaged about 64,000 tons per year (1981-84), mainly for public works and timber sale contracts. Material sales can represent about half of this figure but more commonly equals less than ten percent. Salable minerals have not been identified in any issue or concern. Consequently, they are not considered hereafter.

FIGURE III-2 Federal Mineral Classification and Degree of Forest Service Control.

Locatables	Locatable minerals include most metals and some non-metals (e.g. barite, fluorite and gypsum). All federal lands not withdrawn from mineral entry are available for the exploration and development of locatable minerals by any U.S. citizen under provisions of the authoritative 1872 Mining Law, as amended. Forest Service control of such activities is limited to minimizing surface impact and is accomplished via an environmental analysis of indivisual proposals (36 CFR 288A).
Leasables	Leasables are specific mineral resources identified by the Mineral Leasing Act of 1920, as amended. These include oil and gas, coal, oil shale and geothermal resources (uranium is locatable) -- as well as sodium, potassium, phosphate and a few others. Forest lands open to mineral leasing may be leased from the Department of Interior for the purposes of exploring for and developing such minerals. Although Forest Service authority for leasables is still oriented toward surface protection, its control of prospecting and development of leasables is considerably stronger than that for locatables.
Saleables	Common varieties of sand, gravel and stone, and some other widely available mineral materials, may be disposed from federal lands by sale under the Materials Sale Act of 1947, as amended. This law allows the Forest Service complete discretion in the disposal of saleable minerals from lands administrated by it.



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SUPPLY

Measured resources on unpatented and patented mining claims within the Okanogan National Forest constitute an economic and marginal reserve base containing at least 33,000 ounces gold, 200,000 ounces silver, 2.8 billion pounds copper, and 9.8 million pounds zinc. The forest offers, in addition to these metals, a high potential for the discovery of valuable deposits of antimony, iron, lead, molybdenum, tungsten and uranium (Grant, 1976 and 1982). All of the above metals are listed as strategic/critical by the U.S. Bureau of Mines.

The probability of exploration and development of one or more of the above minerals is displayed in the Minerals Potential Map found in the map packet and Table III-2.

The forest offers relatively low potential for leasable minerals. Consequently, except for uranium, important energy minerals are unlikely to be developed.

CURRENT USES

There are approximately 3,000 mining claims on the Okanogan National Forest, representing some 60,000 acres, most of which lie west of the Okanogan River. Seventy-one patented mining claims covering 1,274 acres lie inside the Forest boundary.

Locatable mineral production from the forest in 1984 was limited to about $10,000 worth of gold and silver from start-up operations at the Minnie Mine in the southern Methow Valley, and a minor amount of placer gold from the Canyon Creek drainage. Base and precious metal reserves blocked out at the Alder Mine near Twisp, and the Mazama porphyry copper deposit owned by Quintana Minerals Corporation, continued to be subeconomic. No immediate plans for development of these resources are known.

An estimated $700,000 was expended by private industry for the development of mining claims on the forest in 1984. A large part of this sum was used for development of the Minnie Mine and exploration on the Ichobod claim group in the southern Sawtooth Ridge mountains. The remainder was expended mainly for the purpose of meeting assessment work requirements. An equal or greater amount was spent for similar purposes adjacent to the forest and in other parts of Okanogan County.

The mineral potential of the Okanogan National Forest is compared with access restrictions resulting from current management practices and land status in Table II-2. Note that 642,400 acres or 38 percent of the total forest acreage is currently withdrawn from mineral entry. An additional 14 percent is highly restrictive as to mineral access and development.

TABLE III-2 Relationship of Mineral Potential and Current Access Availability on the Okanogan National Forest

	Mineral Potential in Acres (x1000)1/				
Access 2/ Restrictions	High	Medium-High	Medium-Low	Low/ Unknown	TOTAL ACRES (% of Forest)
Withdrawn 3/	27.0	51.6	111.7	452.0	642.4 (38%)
High 4/	33.9	45.0	60.2	56.6	195.7 (11%)
Moderate 5/	43.4	92.9	45.7	307.9	489.9 (29%)
Low 6/	43.8	56.7	75.4	202.2	378.1 (22%)
TOTAL ACRES (% of Forest)	148.1 (9%)	246.2 (14%)	293.0 (17%)	1,018.7 (60%)	1,706.0 (100%)

1/ Grant (1982), Lentz (1985) Note: "Moderate" and "Low" potential catagories shown on the Minerals Potential Map should read "Medium-low" and "Low/Unknown" respectively.

2/ "Access" is here defined as the relative ease by which a prospector or miner obtains physical access to an area and completes possible surface disturbing operations.

3/ Includes all statutory and administrative withdrawals.

4/ Includes the North Cascades Scenic Highway and semi-primitive unroaded prescriptions.

5/ Includes roaded recreation, key deer winter range, and areas having a Visual Quality Objective (VQO) of retention or partial retention.

6/ Includes General Forest prescriptions having a VQO of modification.

Twenty-six non-competitive oil and gas leases aggregating 41,353 acres have been filed on forest land up and down the Methow Valley. An additional 7,526 acres proposed for lease are currently pending. This represents $41,353 in Federal lease receipts for 1984, one-half of which are returned to the state. The leases are considered highly speculative, as no oil and gas exploration or production is known from forest or adjacent lands in this region.

DEMAND

World demand for minerals and mineral fuels has increased between 5 and 7.5 percent annually since 1950. U.S. consumption of these commodities has increased at a smaller rate: 3.8 percent annually from 1950 to 1970, and 2 percent annually from 1971 to 1979 (Wenner, 1984, p. 10). Despite these long-range trends, the metals market has a notoriously cyclic nature. The recent economic recession has lowered nearly all metal prices. This, combined with competition from foreign producers and other factors, has crippled the domestic copper industry. For this reason, it is unlikely that Quintana's Mazama deposit will be placed into production during the planning period. The Alder Mine reserves are more apt to be developed because of their precious metal and zinc content.

The willingness of the minerals industry to spend exploration dollars on Okanogan Forest lands represents a demand which is difficult to forecast. However, long-term growth in metals consumption, additional land withdrawals, and depletion of existing mineral reserves promises to intensify public interest in forest minerals over the planning period.

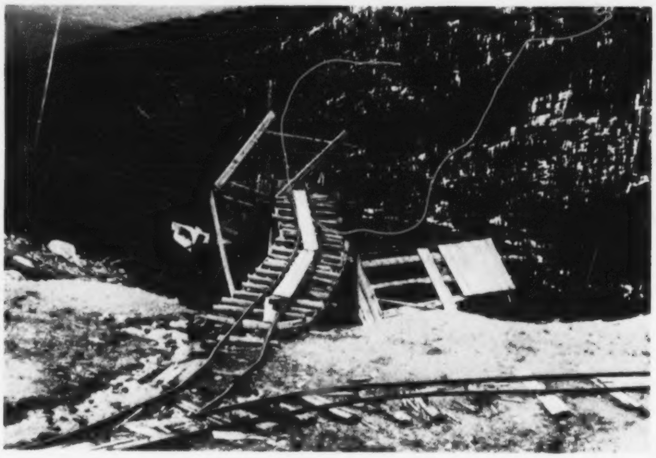
PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

Locatable and leasable minerals are unique among National Forest resources. Forest Service responsibilities for these minerals on forest lands are centered on surface protection, while actual management responsibility lies with the Department of the Interior.

It is basic Forest Service policy to manage forest lands to accommodate and facilitate energy and other mineral exploration, development and production, while integrating these activities with the use and conservation of other resources to the fullest extent possible (FSM 2802).

OPPORTUNITIES

There is an opportunity to maximize mineral accessibility on forest lands, providing low access restrictions on 121,000 acres of high potential, 194,000 acres of medium-high potential, and 181,000 acres of medium-low mineral potential lands.



AIR QUALITY

The remote location, steep mountainous terrain, daily topographic winds and westerly maritime storm patterns produce optimum atmospheric mixing conditions that generally maintain a high level of air quality during most of the year over the Okanogan National Forest and Okanogan County.

SUPPLY POTENTIAL

The Clean Air Act (42 U.S.C. 1857 et. seq.) seeks to maintain or improve the existing high air quality in rural areas by creating air quality classes. Within these classes allowable increases or increments are established from national standards.

Under the Act, all wildernesses and National Parks established prior to August 7, 1977 are designated as Class I. All National Forest land outside wilderness and any wilderness additions made after August 7, 1977 are assigned Class II status. Class I allows the least increase in air pollutants.

Current Forest policy calls for treating all Class II wilderness additions as designated Class I areas. States have the authority to redesignate classes, and Forests may nominate Class II wilderness areas for Class I consideration. The Okanogan National Forest has the following designated airshed acres under Class I and Class II.

TABLE III-3 Okanogan National Forest Class I and Class II Airshed Acreage

Area	Class I	Class II
Pasayten Wilderness	505,524 Acres	----
Pasayten Addition	----	24,507 Acres
Chelan-Sawtooth Wilderness	----	96,169 Acres
Remainder of the Okanogan NF	----	1,080,000 Acres
Total	505,524 Acres	1,200,676 Acres

Each Class I wilderness has unique features that set it apart from other wilderness areas within the system. Specific protection objectives must be established for each wilderness area based on those unique features and the potential effects of introduced pollutants on the physical, biological and social characteristics of specific wilderness being evaluated under the study.

Air Quality Related Values (AQRV's) are the features of the wilderness that can be affected by air pollution. These include odor, flora, fauna, water, visibility, soil, geologic features and cultural resources. Currently visibility is the only Air Quality Related Value identified for protection within the Forest's designated Class I area.
The Forest is currently cooperating with the Environmental Protection Agency (EPA) to sample selected alpine lakes within the Forest's designated wilderness areas for effects of acid rain deposition.

Data is required to quantify the effects of air borne pollutants on any additional Air Quality Related Values (AQRV's) identified as essential for the protection of the wilderness character in the Pasayten Wilderness. Once base levels are identified, a determination must be made as to the amount of human-caused change allowed (ie. Limits of Acceptable Change) which does not adversely affect the overall wilderness character. In some instances the Limits of Acceptable Change (LAC) may be no change over established base levels.

CURRENT USES

The current Okanogan National Forest prescribed burning program produces approximately 7,600 tons of Total Suspended Particulates (TSP) per year. TSP is one of the wood combustion products found within smoke that directly affects visibility.

DEMAND

It is difficult to quantify the demand for air quality. Based on the amount of input received during issue identification for both this planning process and the Early Winters Winter Sport Site Planning process, residents and visitors to Okanogan County wish to see air quality maintained (see Issues and Concerns in Chapter I).

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The maintainance of a high level of air quality is a cooperative effort between Federal, State and local authorities. Federal and State laws serve as the basis for this effort. These laws, and the implementing regulations, define the parameters for maintenance of local and regional air quality as well as the specific responsibilities and authorities of all the agencies involved.

The State of Washington Smoke Management Plan identifies two areas as "smoke sensitive" within the area of influence of the Okanogan National Forest. The Plan calls for minimizing smoke intrusion into the orchard areas along the east slope of the Cascades, during daylight hours from August 15th through September 30th, and within all high use recreation areas during peak use periods.

The forest's participation in the State of Washington Smoke Management Plan is based on a 1971 Memorandum of Agreement between the Pacific Northwest Region (Region 6) of the Forest Service and the State of Washington.

The protection of visibility within the Forest's Pasayten Wilderness would be accomplished through the Forest's adherance to the State of Washington's Implementation Plan (SIP). The SIP includes specific direction in the form of Visibility Protection Guidelines for Class I areas. The guidelines call for limiting prescribed burning smoke intrusions into the Forest's Class I wilderness area and the North Cascades National Park during what is described as Visibility Important Days (re. weekend days between July 1 and Labor Day).

The Clean Air Act also requires identification of unacceptable emissions from the activities of others outside of the National Forest. This is being accomplished through the formal permitting process associated with the Prevention of Significant Deterioration (PSD) requirements of the Act. The PSD process is established to further protect the Class I Areas (i.e. Wilderness and National Parks) from the traditional sources of man's pollution (such as power generators, smelters, industrial complexes, etc.). Any proposed construction of a potentially polluting facility requires the completion of a study assessing the potential impacts of the pollutants emitted on a wilderness area.

To date only one such study had involved the wilderness areas managed by the Okanogan National Forest. This PDS Review was done in response to an Environmental Impact Statement covering the construction of a coal fired electrical power generation plant to be located at Creston, Washington.

OPPORTUNITIES

Reduction of the level of Total Suspended Particulates (TSP) produced from prescribed burning on the Okanogan National Forest is possible by the manipulation of the season of burn, such as more spring burning which consumes less of the available fuel, or removal of the heavier woody residues from the site prior to burning thereby making them more readily available to firewood gatherers.

The opportunity with the greatest potential for reducing TSP will be through the identification of new potential markets for previously unutilized wood residues from timber sales and timber stand improvement projects. An incentive system must be developed to allow potential purchasers to make a profit from this wood resource. Currently no such incentive systems nor markets exist for the Okanogan National Forest and vicinity.

FIRE PROTECTION AND FIRE USE

Fire has been and will continue to be a major force in shaping the mosaic of vegetation patterns on the Okanogan National Forest. As an ecological force, fire can maintain certain species within stands while eliminating others, based on individual tree species susceptibility to fire. Specific interactions of fire and its effects on the existing vegetative types on the Forest can be found in the Biological Environment section of this chapter.

The recognition of fire's natural role within specific plant communities has contributed to the establishment of the current wildfire suppression policy and the use of prescribed fire on the Okanogan National Forest.

Fire Suppression

The suppression of wildfires on the Okanogan National Forest is based on minimizing suppression cost and resource value loss consistent with land and resource management objectives and the established fire managment direction. The suppression strategies appropriate to meet management direction range from direct control, minimizing acreage burned, to more indirect methods of containment and confinement. Confinement maybe to simple observe the fire when it is expected to be self-confined within a defined area (see Glossary for definition of terms). Wildfires will not be managed to accomplish resource objectives.

During the period 1975-1985, the Forest experienced 833 fires which burned 9,473 acres. Of that total, 630 (75%) were caused by lightning and 206 (25%) were humancaused. During the fire seasons of 1983-1985 a total of 25 (14%) of the 177 lightning fires that occurred during that period were suppressed using a confinement fire strategy in the Forest's wilderness and semi-primitive recreation areas. The total acres burned by these confinement fires was 3,453 acres which accounts for approximately 36% of the total acres burned for the entire 10 year period.

Current Fire Uses

The Okanogan National Forest used prescribed fire to treat approximately 37,000 acres of woody residues (slash) between 1981 and 1984. An additional 16,000 acres were treated over the same period by mechanical methods to crush slash.

Slash treatment methods varied based on the amount of residue created, tolerance of the residual stand to fire, visual quality objectives, access, site regeneration needs and treatment costs. Due to the above factors, approximately 60-75 percent of the acres treated, during this period, with prescribed fire where either machine piled or handpiled prior to burning.

The additional cost of preparation of the slash by piling, prior to physical disposal by prescribed burning, an increasing demanad for available firewood, and the need to leave slash for wildlife and site productivity maintenance has caused the fuels managers to delay fuel treatment to achieve better utilization of the wood residues and to only selectively treat the slash required to meet hazard reduction and site preparation objectives. In most instances utilization has not reduced the slash fire hazard level nor effectively prepared the site for regeneration. In these instances prescribed fire will be used to achieve the management objectives for the area.

Fire Hazard and Risk

The greatest **fire hazard** on the Forest is from natural fuel accumulations in the unmanaged stands. Fuels from harvesting and thinning projects do not appreciably contribute to the Forest's overall fire hazard. Under current management direction, fire hazard will continue at its current level or possibly increase if the lodgepole pine stands are entered through harvest activities. This increase will be short-term compared to the level and extent of fire hazard that may develop if the lodgepole pine stands are not harvested.

Failure to harvest these stands promptly, combined with a large scale mountain pine beetle attack, would cause a long-term increase in fire hazard from standing dead lodgepole pine over 158,000 acres of the Forest.

Fire risk is not expected to remain at its current level on the Forest. The primary factor that could increase the fire risk situation would and the construction of the Early Winters Destination Ski Resort in the Methow Valley.

Another factor of major concern in the assessment of future fire risk is the current construction trend of summer and permanent housing on private land adjacent to the Forest. The risk of humancaused wildfires spreading from State-protected land onto the Forest at this "rural/urban interface" will increase through the next decade.

The long-term demand for goods and services on the Okanogan National Forest does not allow for large scale losses by destructive wildfires. Management of the natural and timber management created fuel profiles must be accomplished in order for the Forest to achieve its overall protection objectives, and thereby meet its land and resource management direction.

Plans, Policies, and Cooperative Agreements with Other Agencies

In an effort to further reduce fire suppression expenditures many wildland fire protection agencies, within North Central Washington, have entered into reciprocal cooperative protection agreements.

The Okanogan National Forest has entered into cooperative agreements with the Department of Natural Resources, State of Washington, Bureau of Indian Affairs; Colville Confederated Tribes, Department of Interior; North Cascades National Park and the Province of British Columbia, British Columbia Forest Service. These agreement provides for sharing of personnel and equipment for initial attack and support for up to 24 hours at no cost to the benefiting agency.

The Forest also protects 18,659 acres of adjacent Bureau of Land Management, Department of the Interior land under a pay protection contract.

Outside of the this basic agreement, the Forest has served in a logistical coordinator role assisting neighboring federal and state agencies in suppression of large project fires that have the potential to threaten Forest Service land. This is due, in part, to the Forest's improved communications and highly skilled personnel and because of the Forest Services total mobility concept which allows for utilization of manpower and equipment from any point in the United States. This demand is likely to continue or increase in the future due to budgetary and manpower constraints affecting both state and federal protection organizations within North Central Washington.

Opportunities

Specific examples of opportunities for using prescribed fire can be found in other resource sections of this chapter.

LANDS

National Forest lands comprise nearly 98 percent of the land within the proclaimed Okanogan National Forest Boundary. Wilderness lands administered by the Okanogan National Forest are entirely National Forest, with the exception of 87 acres of private land (patented mining claims) in the Lake Chelan-Sawtooth Wilderness.

SUPPLY

The Okanogan National Forest includes enough lands and natural resources to efficiently manage as a National Forest.

CURRENT USES

The Okanogan National Forest annually acquires 6 to 8 access road rights-of-way (R/W), and shares in the cost of at least one other road, to keep current with timber access road needs.

Individuals, assocations etc, currently hold 247 special-use permits to use Okanogan National Forest land. These uses total 1,966.9 acres (Table III-4).

TABLE III-4 Special Use Permits

Type of Permit	Total Cases	Total Uses	Total Miles R/W Length	Total Acres Permitted Area
Recreation Uses	61	61	78.0	360.1
Agriculture Uses	16	17	1.8	524.0
Community Uses	3	3	.0	1.6
Industrial Uses	5	5	.0	109.8
Research, Study and Training Uses	18	18	.0	188.7
Transportation Uses	53	53	73.8	631.2
Utilities and Communications Uses	37	37	32.8	129.3
Water Uses	54	54	13.8	22.2
Total for all Kinds of Permits	247	248	200.2	1,966.9

The subdividing of adjacent private lands into small tracts, and the purchase and use of these smaller private parcels adjacent to the National Forest boundary for rural recreation purposes are presenting an ever increasing chance for encroachment on the National Forest system lands. These encroachments come in the form of fences, outbuildings, cabins, access roads and utilities. As of January 1, 1985, about 50 encroachments on to the National Forest were tabulated.

DEMAND

Demand to utilize all portions of public land will increase in the future. Road or trail access will be needed to these areas which now have no deeded access easements.

Many adjoining landowners move onto their properties and try to utilize them to the fullest extent without establishing their property lines. Possibilities of encroachment on National Forest lands will increase until the boundaries between the national forest and adjoining lands are well marked.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

State and County health and zoning laws, along with increased private land development, will result in more requests to use National Forest lands for private purposes. Private subdivision enclaves within the National Forest will require higher standard roads, water sources, sewage disposal areas, etc. Some people will want to install many such facilities on National Forest lands rather than their own lands.

OPPORTUNITIES

Several tracts of lands of other ownership are present inside the National Forest which, if acquired, would reduce the cost of managing adjacent National Forest lands by reducing the need for boundary surveys and road right-of-ways, fewer possibilities of encroachments, and fewer requests for private use of National Forest lands. The Okanogan National Forest is now discussing two land exchanges, one with Crown-Zellerbach which includes about 3,000 acres, and another with the State of Washington which includes nearly 12,000 acres.

Completing the Forest Plan will help determine needed access routes across non-National Forest lands to serve the Okanogan National Forest. Once this is done, acquisition of easements for these routes prior to the these lands being subdivided should be much simpler and less costly.

Current permitted uses of National Forest lands may not be serving their original purpose and may no longer be needed. Those uses that are no longer necessary or where the land has a greater value for public use should be terminated.

The Small Tracts Act of January 12, 1983 permits the Forest Service to sell or trade to qualified individuals certain small tracts of land which are not in the public's interest to keep as National Forest. The Okanogan National Forest has several opportunities to use the Small Tracts Act.

INFRASTRUCTURE IMPROVEMENTS

Infrastructure improvements on the Okanogan National Forest include roads, transportation corridors and utility corridors.

ROADS

The National Forest transportation system is planned, constructed and operated to facilitate planned Okanogan National Forest land and resource management objectives. The road standard is a direct result of the objectives the road is intended to serve. The cost of construction and maintenance is a direct result of the road standard and operation. For example, a road constructed for only logging vehicles would typically be narrow, closely follow the topography (numerous sharp curves and abrupt changes in grade) and have a rough surface. This road would cost a minium to construct, and if used only during suitable weather and blocked after logging use, cost a minimum to maintain.

Any additional objectives that require use by more and different vehicles, or extend the time of use will significantly increase road construction and maintenance costs. For example, if the above road will also be used for firewood gathering after the timber sale, the road will be used for a longer period of time, and maintenance costs will increase. If the road is to be used concurrently by logging vehicles and recreationists in highway vehicles, the road standard will increase (smoother surface, wider road, and straighter horizontal and vertical alignment) and road construction and maintenance costs will significantly increase.

Supply

Okanogan National Forest roads total approximately 2,100 miles, and vary from two-lane paved roads in major access corridors to narrow primitive roads suitable only for high clearance vehicles (see Figure III-3).

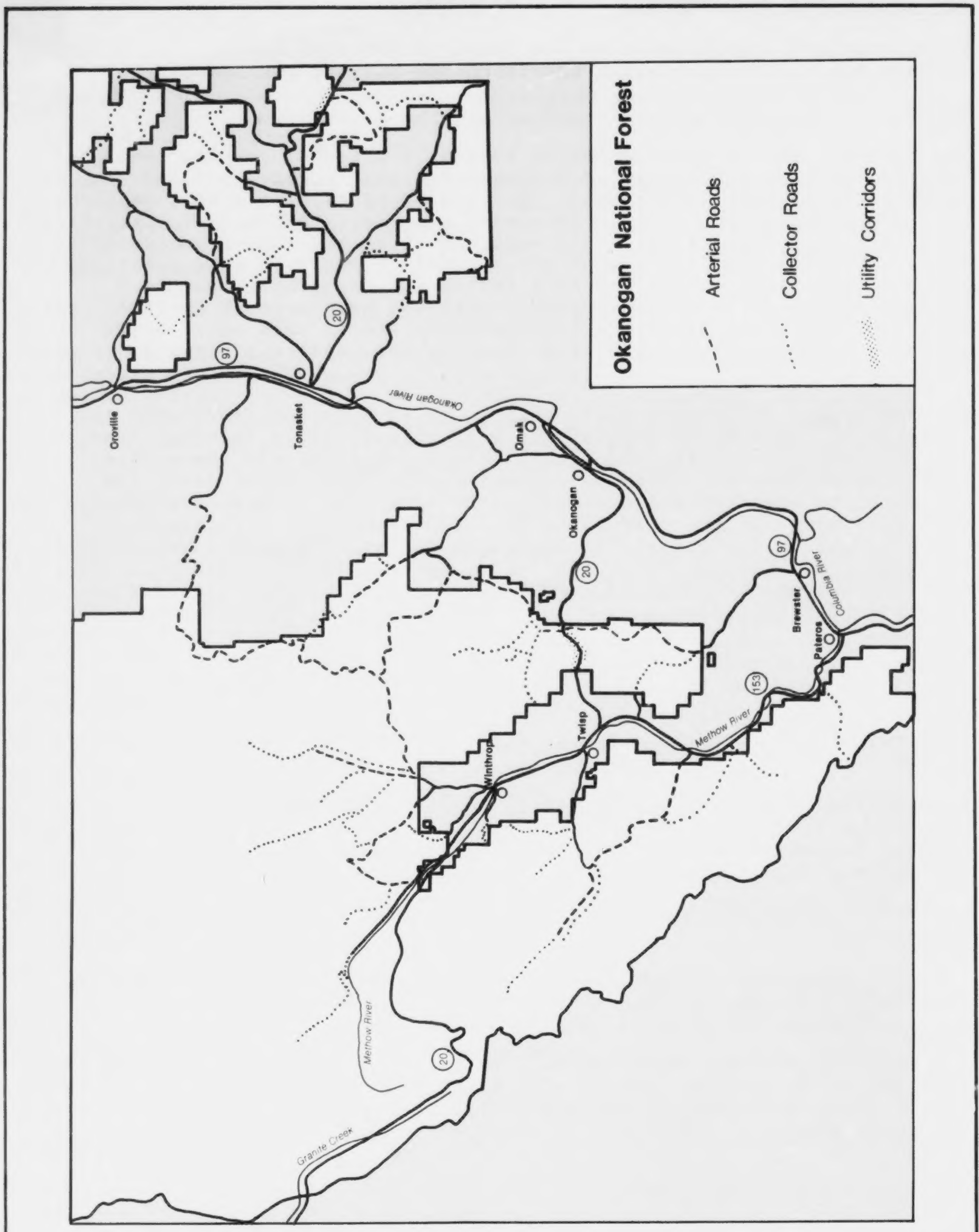
Road access is currently provided in about 50 percent of the non-wilderness portion of the Okanogan National Forest. The existing road density (miles of road per square mile) of roaded lands is 2.56 miles of road per square mile.

The Forest Service classifies roads in one of the following three categories:

1. Arterials - Roads forming a link between towns or serving a major drainage or other major traffic generator. The Middle Salmon-Boulder Road No. 37 over Baldy Pass is one example.

2. Collectors - Roads usually tributary to arterials. May or may not be connecting routes. The Eight Mile Road, No. 5130, from the Chewuch Road, No. 51 (an arterial), to Billy Goat Corral is a collector.

Figure III-3


Okanogan National Forest
Arterial Roads
Collector Roads
Utility Corridors
Oroville
Tonasket
Omak
Okanogan
Brewster
Pateros
Twisp
Winthrop
Okanogan River
Columbia River
Methow River
Methow River
Granite Creek
97
20
97
20
153
20

3. Local - Usually short, dead-end roads that serve a limited number of resources.

For safety reasons, most local roads require closure to other traffic during log hauling operations. Some segments of the arterial and collector road system are also of a standard too low to allow safe use by mixed traffic (log trucks and recreation traffic). These segments of low standard road may require closure or discouragement to other traffic during commercial hauling operations.

Current Uses

Approximately 20 percent of the road mileage on the National Forest is currently blocked to all vehicular traffic to minimize resource impacts and lessen road maintenance costs. Another 30 percent of the road mileage consists of low standard roads which receive limited maintenance and are suitable only for high clearance vehicle passage (Table III-5).

TABLE III-5 Classification of Existing Roads for Suitability of Vehicle Access

	Suitability of Roads for Vehicles		
Road Type	Blocked	High Clearance	All Vehicles
	miles		
Local Roads	504	654	480
Arterial and Collector Roads	---	---	508
Total	504	654	988

Demand

The demand for development of the Okanogan National Forest transportation system stems directly from Okanogan National Forest land and resource management objectives or demands. Local roads are constructed primarily for timber harvest operations. The road density (miles of road per square mile of land) is determined by the most economical mix of transportation/logging systems, while considering other resource impacts. Required road density for timber harvest operations varies from 4.48 miles per square mile on gentle terrain to 3.20 miles per square mile on moderate and steep terrain. The arterial and collector roads are now in place, but concurrent use by commercial trucks and other types of vehicular traffic is not safe or economically practical on some of these roads. Those arterials and collectors with the highest demand for concurrent use by commercial trucks and others may require reconstruction to a higher standard.

Plans, Policies and Controls of Other Agencies

The National Forest transportation system is inter-connected with county roads; State Highways 20, 153 and 155; and U.S. Highway 97. Transportation system regulation by the State and County apply on their roads. State laws (46.61 RCW) governing the operation of vehicles on public roads apply to National Forest roads. Licensing requirements of vehicles and operators, required vehicle equipment, and speed limits apply on Okanogan National Forest roads. The National Forest develops and operates transportation systems in cooperation with the Colville Confederated Tribes, Washington State Department of Natural Resources, Okanogan County, Washington State Department of Transportation and Federal Highway Administration when it is necessary or opportune to do so.

Opportunities

The opportunity to identify short and long-term Okanogan National Forest land and resource management objectives in the Forest Plan will provide the base from which plans to construct, maintain and operate the National Forest transportation system can be made. The spectrum of opportunities, goods and services provided by the transportation system to meet those objectives, such as timber production and harvest, firewood gathering, all types of recreation, minerals, range, etc., will define where roads should or should not be constructed/reconstructed, kept open or blocked, and what standard a road should be.

TRANSPORTATION AND UTILITY CORRIDORS

Transportation and utility corridors are identified and designated to consolidate and reduce the impacts associated with construction and maintenance of facilities for cross-forest transportation of commodities by rail, highway, powerline or pipeline.

Two transportation and utility corridors have been designated on the National Forest. These are located along State Highway 20 and include seven miles at Loup Loup Pass and two miles at Wauconda Pass (see Figure III-3). No additional needs for transportation or utility corridors had been identified until June, 1985. At that time, the Bonneville Power Administration identified another possible corridor that could cross the Okanogan National Forest along Forest Road No. 4150 for 9 miles. An alternative to the corridor along Road No. 4150 would be an additional powerline in the corridor along State Highway 20 at Loup Loup Pass. The additional powerline would be necessary for the proposed Early Winters Ski Area.

WILDERNESS

As defined in the Wilderness Act of 1964, "A wilderness, in contrast with those areas where man and his works dominate the landscape, is recognized as an area where the earth and its community of life are untrammeled by man; where man himself is a visitor who does not remain. These areas are further defined to mean an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic or historical value."

Wilderness is managed under a nondegradation policy to protect the qualities unique to the area (USDA 1981). The policy recognizes that in Wilderness, one can find a range of natural and social settings from the most pristine to those where naturalness and opportunities for solitude have been diminished by established uses.

SUPPLY POTENTIAL

Approximately 37 percent of the Okanogan National Forest land base is in Wilderness (Roadless Areas Resource Map). The Pasayten Wilderness includes approximately 530,000 acres. Of the approximate 146,000 acres in the Lake Chelan/Sawtooth Wilderness, 96,200 acres are on the Okanogan National Forest.

Within the two Wildernesses, several wilderness recreation opportunities occur (Table III-6).

> Trailless opportunities are provided in areas outside grazing allotments characterized by an essentially unmodified natural environment of large size. Users have an extremely high probability of experiencing isolation from the sights and sounds of humans, independence and self-reliance through the application of outdoor skills in an environment that offers an extremely high degree of challenge and risk. Interaction between users is very low and evidence of other users is minimal. The area is free from evidence of human-induced restrictions and controls. Access is confined to cross-country travel.
>
> Limited trailed opportunities are provided in areas characterized by a predominantly unmodified natural environment of moderate to large size. Users have a high probability of experiencing isolation from the sights and sounds of humans, independence and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk. Interaction between users is low and evidence of other users is

minimal. Human-induced restrictions and controls, if present, are subtle. Constructed trail access is limited to existing trails necessary to pass through the area and is at the difficult to more difficult level (USDA 1985).

Trailed opportunities are provided in areas characterized by a predominantly natural environment of moderate to large size. Users have a high probability of experiencing isolation from the sights and sounds of humans, independence and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk. Interaction between users is low to moderate, but evidence of other users is often present. Human-induced restrictions and controls, if present, are subtle. Constructed trail access is apparent and is provided at a difficulty level appropriate to the target user group, but is generally difficult to more difficult (USDA 1985).

TABLE III-6 Inventoried Wilderness Recreation Opportunities

	Wilderness Recreation Opportunity		
Area	Trailless	Limited Trails	Trailed
	acres		
Pasayten	172,200	188,800	169,000
Lake Chelan/Sawtooth	-	60,600	35,600
Total	172,200	249,400	204,600
Potential Capacity (Visitor Days)	74,000	214,000	879,000

Approximately 990 miles of trail, including 26 miles of the Pacific Crest National Scenic Trail are located in wilderness on the National Forest (USDA 1981). Trails are not open to motorized use. Approximately 530 miles of trail need reconstruction or obliteration. Wilderness objectives were generally not considered during location and design. This often resulted in trails being located in moist drainage bottoms and with clearing widths wider than necessary. Many trails were not obliterated during reconstruction projects and are not needed. Recent efforts have been made to lessen clearing limits during annual maintenance. More emphasis is now being placed on wilderness objectives during location and design and on obliterating unnecessary trails.

For a discussion of air quality related values (AQRV's), refer to the Air Quality section of this chapter.

CURRENT USES

Average annual wilderness use (1980-1984) on the National Forest has been 89,000 recreation visitor days. This includes 19,000 visitor days of hunting and fishing use. Use ranges from extremely light in the more remote sections, to heavy along major trunk trails and around favored attractions. Most use occurs from July through October. Camping, hiking, horseback riding and hunting are the primary uses. About 85 percent of the use is by people from outside Okanogan County (USDA 1980-1984). Numerous outfitter-guides provide service in both the Pasayten and Lake Chelan-Sawtooth Wildernesses.

Two sheep allotments, one cattle allotment and a portion of another cattle allotment are currently under permit in the Pasayten Wilderness. Portions of two sheep allotments and one cattle allotment are under permit in the Lake Chelan/Sawtooth Wilderness.

A diversion of the East Fork Pasayten River sustains the level of Big Hidden Lake in the Pasayten Wilderness. No other impoundments or diversions exist.

Currently, mineral related activities are occurring in the Tungsten Mine, Devils Park and Anacortes Crossing areas of the Pasayten Wilderness. Mineral activities in the Lake Chelan-Sawtooth Wilderness are occurring in the North Creek, Twisp River and Abernathy Ridge areas.

The Pasayten Wilderness contains no private lands. 87 acres within the Lake Chelan-Sawtooth Wilderness are in private ownership.

Administrative sites are located at Bighorn Creek, Spanish Camp, Stub Creek, and the Pasayten Airport in the Pasayten Wilderness and at War Creek in the Lake Chelan-Sawtooth Wilderness. The U.S. Geological Survey maintains a snow survey cabin in Freezeout Creek and a stream gauging station in Andrews Creek. A Remote Automated Weather Station (RAWS) is located in the Judy Creek drainage of the Pasayten Wilderness.

Numerous other shelters, trapper cabins and mining cabins are present, particularly in the Pasayten Wilderness. These structures are in various stages of deterioration and in many cases serve to concentrate use which results in soil and vegetation impacts. Some may have historical value.

DEMAND

Wilderness demand is expected to increase to 118,000 recreation visitor days by the year 2000 and to 164,000 recreation visitor days by the year 2030 (Washington State 1979).

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The National Forest manages the wildlife and fisheries habitat in wilderness. However, the Washington State Department of Game and Department of Fisheries retains jurisdiction over the wildlife and fish resource and are responsible for hunting and fishing regulations. Their programs, particularly the Early Buck Season and fish stocking program, affect wilderness use.

The International Boundary Commission was established by International Treaty in 1924. The charter of this Commission is to maintain the International Boundary between the U.S. and Canada, 52 miles of which is along the Pasayten Wilderness. The boundary was last cleared in 1984.

The Bureau of Land Management (BLM) inventoried approximately 5,500 acres in the Chopaka Mountain area east of the National Forest which meets the Roadless Area Review criteria in the Federal Land Policy and Management Act. The BLM has recommended the area not be classified as wilderness (USDI 1982).

The National Park Service currently manages approximately 526,650 acres (78 percent) of the total North Cascades National Park Service Complex, which lies west of the National Forest, as a wilderness subzone. These lands have been proposed for Wilderness classification (USDI 1978).

OPPORTUNITIES

No additional acreage will be considered for wilderness designation during this planning cycle. The Washington State Wilderness Act of 1984 determined that with respect to National Forest system lands in the State of Washington reviewed during RARE II, "that review and evaluation or reference shall be deemed for the purposes of the initial land management plans to be adequate consideration of the suitability of such lands for inclusion in the National Wilderness System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the plans" (U.S. Laws, Statutes 1984). At such time as this initial land management plan for the Okanogan National Forest is revised, the wilderness option shall be reviewed for those lands remaining unroaded and suitable for wilderness classification. (Refer to Chapter II, Table II-3a and Appendix C for the acres and specific areas which will remain suitable for wilderness classification).

An opportunity is provided to differentially manage both the Pasayten and Lake Chelan-Sawtooth Wildernesses while still meeting the requirements of the Wilderness Act (e.g. some areas can be managed as trailless, other areas can be managed with limited trails, and other areas can be managed with a trail system capable of handling higher use levels).

ROADLESS AREAS

In addition to the 37 percent of the National Forest in wilderness, another 28 percent is unroaded and undeveloped (Roadless Areas Resource Map). The remaining 35 percent has been developed.

In the late 1970's, large unroaded areas on the National Forest were studied for possible inclusion into the Wilderness Preservation System. Fifteen areas with a total acreage of 625,005 acres were identified (USDA 1979). Reinventory because of passage of the Washington State Wilderness Act of 1984 and management activities which have impacted the areas have resulted in fourteen areas totalling 481,368 acres (Table III-7). Appendix C contains specific detailed characteristics and resource values of each area.

TABLE III-7 Inventory of Okanogan National Forest Roadless Areas

NUMBER	AREA NAME	ACRES	RANGER DISTRICT
6001	Jackson Creek	10,218	Tonasket
6002	Bodie Mountain	6,044	Tonasket
6003	Clackamas Mountain	15,125	Tonasket
6015	Hungry Ridge	12,451	Twisp
6016	Black Canyon	12,915	Twisp
6017	South Ridge	5,700	Twisp
6018	Granite Mountain	37,416	Twisp/Winthrop
6019	Tiffany	24,027	Tonasket
6021	Mt. Bonaparte	13,400	Tonasket
6023	Long Draw	5,482	Tonasket
6024	Long Swamp	80,540	"/Winthrop
6025	Pasayten Rim	15,410	Winthrop
6026	Liberty Bell	112,430	Winthrop
6027	Sawtooth	130,210	Twisp/Winthrop
Total Acres		481,368	

BIOLOGICAL ENVIRONMENT

The components of the biological environment that would be affected by the alternatives action are vegetation and wildlife (including fish). Vegetation is first discussed in this Chapter in general ecosystem terms (forested and non-forested plant communities), then more specifically, in terms of the major resources. This section also includes a discussion of threatened and endangered plants and animals, and research natural areas.

ECOSYSTEMS

PLANT COMMUNITIES

The Okanogan National Forest has abundant amounts of both forested and non-forested ecosystems. Conifer forest ecosystems are dominate on most of the National Forest. Hardwood ecosystems are found throughout the forest and are usually linked to riparian areas. On these sites aspen, black cottonwood and willow are the predominate tree species, with lesser amounts of birch, alder and dogwood. Hardwoods can also be found on drier sites often in association with seeps or perched water tables.

Exotic grasses are also found throughout the forest in formerly disturbed areas. Common introduced species are intermediate wheatgrass, bromes, timothy and orchard grass. These grasses have been seeded on much of the forest to control erosion or invasion of noxious weeds following logging, road building or fires. They have also been seeded in many range forage improvement projects.

Cheatgrass has invaded many grass and shrub communities following disturbance and overgrazing.

As was explained under climate in the previous section, the location of the Okanogan National Forest in relation to the Cascade Crest greatly influences climate on the forest. The climatic zones produce several different ecosystems. West of the Cascade Crest the weather is warmer and wetter. East of the Crest but west of the Okanogan River, weather is generally drier and colder. East of the Okanogan River the climate becomes more moist and warmer.

West of the Cascade Crest

Forested Plant Associations

Tree species west of the Cascade Crest are mountain hemlock, pacific silver fir, western hemlock and Douglas-fir, with some western white pine. Lodgepole can also be found especially in burned areas or other disturbed sites, such as avalanche chutes. Douglas-fir, western hemlock and western white pine are absent at extreme elevations. Undergrowth is commonly shrub dominated by species that require tolerate cool-cold and mosit conditions, such as huckleberry, rhododendron and pachistima.

Non-forest Plant Communities

Natural openings typically consist of wet meadows and marshes, better drained meadows that often occur near timberline in mosaics with rock outcrops and tree patches, and avalanche tracks. Wet meadows and marshes generally support sedges, willows and alders, while better drained meadows support plants like heath, heather, huckleberry, Sitka valarian, sedges and Luetkea. Sitka alder normally dominates avalanche tracts.

East of the Cascade Crest and West of the Okanogan River

Forested Plant Communities

The pine forest zone lies between 2,000 and 4,000 feet in elevation and commonly occurs on southerly and westerly exponsures. As the name implies, the zone is dominated by ponderosa pine in combination with Douglas-fir and other associated species. Common understory plants are ceanothus, bitterbrush, balsam root, snowberry, erigonum and several species of bunchgrass.

The mountain forest zone is found between 3,000 feet and 5,500 feet elevation. Most of the timber producing lands are found in this zone. Douglas-fir is the major conifer species. Ponderosa pine grows at lower elevations and on southerly aspects. Western larch is found east of the Loup Loup summit. Extensive stands of lodgepole pine grow at high elevations in areas where large fires have occurred in the past. Englemann spruce, Douglas-fir and lodgepole pine are common in riparian areas. West of the Methow and Chewuch rivers and north of the Twisp River, western red cedar is occasionally found along streams. Common shrubs are bearberry, snowberry, bitterbrush and spirea. Several species of huckleberry grow on moister, cooler sites. Pine grass is also common and in some areas dominates the ground vegetation.

A large, rolling plateau known as the Meadows is found between the Methow and Okanogan Valleys. This area generally lies at or above 5,000 feet in elevation, and is dominated by lodgepole pine. Englemann spruce and sub-alpine fir occur on the edges of meadows and where fire has been absent for several centuries. Western larch occurs to the north near Long Swamp and Toats Coulee. Meadows and openings are often very wet. Wet openings generally support rushes, sedges, cascade azalea, labrador tea and willows. Huckleberry, labrador tea and cascade azalea are found in drier openings, with huckleberry often dominating ground vegetation. Buffalo berry is found on disturbed sites.

Major tree species found in the sub-alpine zone are Englemann spruce, sub-alpine fir and lodgepole pine in elevation ranges of 5,000 to 7,000 feet. Pinegrass, huckleberry and American twinflower are common understory vegetation.

The alpine zone is rugged with lakes and meadows common throughout the zone. Alpine larch and white-bark pine are found growing here. Heather, dwarf willow and sedges dominate the understory or ground cover. This zone usually occurs at elevation in excess of 6,500 feet.

Non-forested Plant Communities

The grass-shrub zone lies generally under 3,000 feet and on southerly aspects where soils are too shallow to support forest vegetation. This ecosystem is dominated by bitterbrush, sagebrush, cheatgrass, bunchgrass and scattered ponderosa pine.

East of the Okanogan River

Forested Plant Communities

The most common forested association is dominated by Douglas-fir and ponderosa pine. Important associated tree species are western larch and lodgepole pine. Past fires at the mid-level to upper elevation have created many dense stands of lodgepole pine. Understory vegetation found in this plant association is dominated by pinegrass with smaller amounts of serviceberry, snowberry and bearberry.

Englemann spruce and subalpine fir, in association with larch and lodgepole pine, predominate at higher elevations and along moist stream valleys and bottoms. Occasional moist streamside locations in the Jackson Creek area support some western red cedar. Quaking aspen and alder are the most common hardwood species. Ground vegetation consists of horsetail, serviceberry, rose and American twin flower.

Lower elevations in the forest and dry southerly slopes are usually dominated by ponderosa pine. Common species of ground vegetation are bitterbrush, awnless bluebunch wheatgrass, balsam root and Idaho fescue.

Non-forested Plant Communities

Natural unforested openings are of two main types: (1) moist meadows in bottomland, usually dominated by a variety of sedges. Alder and/or shrubby cinquefoil can sometimes by found in these moist openings; and (2) dry openings and hillsides. These dry openings can have mountain big sagebrush and awnless bluebunch wheatgrass. Shrub free openings are usually dominated by bunchgrasses.

FIRE ECOLOGY

Fire is recognized as a major force in shaping the mosaic of vegetation patterns found on the Okanogan National Forest. As an ecological force fire can maintain certain species within stands while eliminating others, based on individual tree species susceptibility to fire. For the purpose of discussing the fire ecology of the Okanogan National Forest, the various plant associations will be combined into three primary stand types: lodgepole pine, mixed conifer and subalpine. It should be noted that natural vegetative cycles may have been interrupted by fire suppression, timber management, grazing by domestic animals (i.e. cattle and sheep) and natural climatic variations. All of these factors have at one time influenced development of the current stand structures and conditions.

Lodgepole Pine

Extensive tracts of evenaged lodgepole pine are a direct result of the cyclic interaction of mountain pine beetle attacks and regeneration of the stand by fire (Brown, 1975).

Many logepole pine have what is called "serotinous" cones that remain unopened on the tree for years (serotinous means late opening). Intense wildfires create favorable seedbed conditions and stimulate opening of these cones giving lodgepole pine an initial competitive advantage over other tree species. The catastropic origin of most of the lodgepole pine stand often leads to the development of stagnant, even-aged stands very susceptible to large scale invasion by mountain pine bettle. In a beetle attack most or all of the stand is killed. These dead stands are very susceptible to wildfire. The subsequent occurrence of large, high intensity wildfires, fed by the heavy fuel loadings opens the serotinous cones and completes the reproductive cycle for lodgepole pine.

At the present time, a large portion of the Forest's lodgepole pine stands are at the age and diameter class where mountain pine beetle attack is imminent (Dolph 1982).

Mixed Conifer

Open stands of species such as ponderosa pine and western larch were more extensive historically than at present because of the incidence of naturally occurring low intensity fires. Research has shown that fires within this mixed conifer type have occurred at intervals of from 5-50 years (Weaver 1974, Heinselman 1978).

Open ponderosa pine/Douglas-fir stands showed similar fire occurrence intervals of from 3-36 years during the period of 1820-1900. After 1900, the interval of natural fire occurrences decreased significantly to 36-46 years (Finch 1984).

The most probable reasons for the difference in fire periodicity since 1900 are the inception of organized fire protection between 1915-1920 and domestic grazing that removed fine fuels with early expansion of cattle and sheep markets, and also the end of aboriginal and settler use of fire for range enhancement. With all these factors combined, the Forest has seen a reduction in total overall fire frequencies and acreage burned since the turn of the century.

Similar trends exist with stands composed of Douglas-fir and western larch. A gradual loss of larch can be attributed to insufficient seedbed preparation normally associated with high frequency, low intensity fires and past selective cutting which selected against western larch.

Subalpine

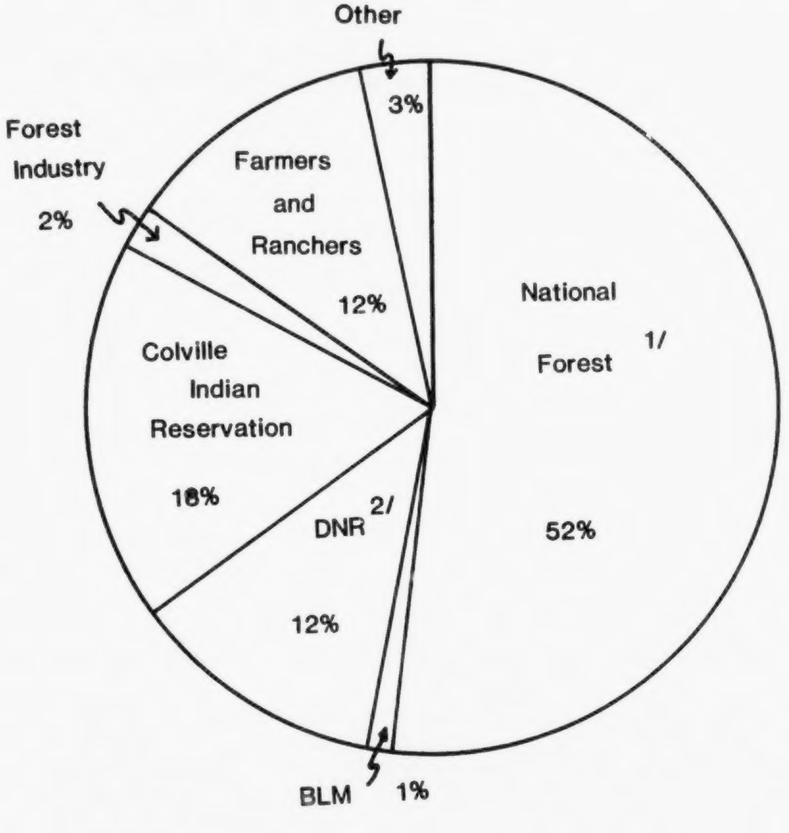
Fire's impact is felt the least on the western portion of the Okanogan National Forest which lies on and adjacent to the crest of the Cascade Mountain Range. This true fir dominated area has experienced large destructive fires in the distant past, but due to the relatively cool, wet climate, fire frequency is substantially lower (i.e. 200-450 years) than on the remainder of the National Forest. The overall decadence of the majority of these stands has produced a fuel buildup that has the potential for producing very large and destructive wildfires. The probability of this event is low without the occurrence of an extended drought.

TIMBER

Bassett and Choate (1974) estimated approximately 2.1 million acres are forested in Okanogan County. Of this they estimated 1.8 million acres (approximately 54 percent) of the county are capable of commercial forest production.

The Okanogan National Forest manages approximately 53 percent of the productive forest lands in the county. About 83 percent of the productive forest land is managed by either the State of Washington, National Forest, or the Colville Confederated Tribes and the Bureau of Indian Affairs (Figure III-4).

FIGURE III-4 FOREST LAND OWNERSHIP IN OKANOGAN COUNTY CAPABLE OF COMMERCIAL TIMBER PRODUCTION (Bassett and Choate 1974). These estimates of commercial forest land for specific ownerships may vary from current estimates because of improved data and changes in definitions or procedures.



1/ Includes lands no longer available for timber management due to Acts of Congress or administrative decision.

2/ State of Washington, Department of Natural Resources.

The 1977 National Forest timber inventory classified approximately 40 percent of the National Forest as productive forest lands that were available and capable of timber production (Table II-8 and Table B-1). Lands suitable for timber production at that time were defined as capable of producing a culmination of mean annual increment (CMAI) of at least 20 cubic feet per acre per year. New planning regulations published in the Federal Register in 1982 required the forest to review all lands and re-classified them as either `Suitable' or `Non-Suitable' for timber production based upon four criteria. Briefly, the four criteria were 1) the land is forested, 2) technology is available to ensure timber production without irreversible resource damage to soils productivity or to watershed conditions, 3) there is adequate assurance that the lands can be reforested following harvesting, and 4) the lands have not been withdrawn from timber production. Criteria are more fully discussed in Appendix B of this document. A comparison of forest lands tentatively suitable for timber production as defined by 1977 criteria and in the 1969 Timber Management Plan, and tentatively suitable forest lands as currently defined using the 1982 regulations is shown below in Table III-8.

TABLE III-8 Comparison of Tentatively Suitable Lands Using 1977 Criteria, Current Criteria and as Contained in the 1969 Timber Management Plan 1/

	1977 Criteria 2/	Current Criteria	1969 TM Plan 2/
	Thousands of Acres		
Lands in Separate Suitability Component 3/	0	98.8	0
Remaining Tentatively Suitable Lands 4/ 5/	685.2	604.4	716.1
Total Tentatively Suitable Forest Lands	685.2	703.2	681.1

1/ Definitions of suitability vary between inventories as described above.
2/ Difference in acreage due to improved mapping in 1977.
3/ Lands where less adequate information exists to predict timber response. Generally these lands have low productivity.
4/ Lands capable of producing 20 cubic feet per acre CMAI.
5/ Differences between 1977 and present estimates are due to withdrawals made by the Washington State Wilderness Act of 1984 and identification of lands physically unsuited for timber production according to criteria in the 1982 regulations.

According to forest inventory data about 75 percent of Suitable forest lands support mixed conifer stands containing ponderosa pine, Douglas- fir, western larch, Engelmann spruce and subalpine fir. The remainder of the stands are dominated by lodgepole pine.

SUPPLY POTENTIAL

The total inventory of saleable timber is shown in Table III-9. Timber volumes for all suitable lands, except low productive lands, are based upon the 1977 inventory. Very little data exist for low productive stands, and for stands that are not suitable for timber production. The 1977 inventory provided estimates of standing volume, but was not designed to sample the range of productivity classes.

TABLE III-9 Timber Inventory for Forested Lands Located Outside of Wilderness

	Millions of Cubic Feet (Board Feet)
Suitable Forest Lands	
Mixed Conifer	792.3 (4,083.6)
Lodgepole	224.4 (996.0)
Low Productive 1/	70.1 (264.3)
Subtotal Suitable Lands	1,086.8 (5,343.9)
Unsuited Forest Lands 1/ 2/	132.9 (558.5)
Total:	1,219.7 (5,902.4)

1/ Timber volumes shown for these areas are "rough approximations" based upon intensive ecology plot data collected between 1981 and 1982.

2/ Unsuitable forest land outside wilderness.

The average productivity of suitable lands available for timber production on the Okanogan National Forest is about 40 cubic feet of wood fiber per acre per year. Potential productivity ranges from less than 5 cubic feet per acre per year to over 110 cubic feet per acre per year. The National Forest has a biological capacity to produce an a long run sustained yield of approximately 23.8 million cubic feet (118 million board feet) per year (Table III-11). This harvest level would require committing all available acres of suitable forest land to intensive timber production. Approximately 25 percent of the biological capacity results from harvesting lodgepole pine stands. In order to reach the biological capacity, investments would be needed to regenerate existing stagnant, poorly growing, low volume stands. Acreage of suitable forest land by timber type and by land class is shown below in Table III-10.

TABLE III-10 Suitable Forest Land by Timber Type and Slope Class

Slope Class	Mixed Conifer	Lodgepole	Low Productive	Total Acres
	--------------Thousands	of	Acres--------------	
Gentle	282.39	105.60	37.98	426.03
Medium	108.77	42.51	33.79	185.07
Steep	42.68	9.90	26.98	79.56
Riparian 1/	12.60	--	--	12.60
All Slope Classes	446.45	158.00	98.75	703.20

1/ Riparian areas include all slope classes.

The Federal Timber Contract Modification Act of 1984 permits timber purchasers in Oregon and Washington to be released from contractual obligations for certain timber sales purchased prior to January 1, 1982. Approximately 88.4 million board feet of National Forest timber previously sold but not harvested has been returned to the Government under provisions of the Act. This timber will be re-sold over the next three years in approximately equal amounts. The volume will be sold as part of the normal timber sale schedule in effect at the time of re-sale. Another provision of the Act was to place a limitation (CAP) of 12.3 Billion Board Feet on the amount of merchantable timber the Pacific Northwest Region of the Forest Service can carry under contract between Fiscal Years 1985 through 1991. The impact of the CAP is unknown. It may or may not cause a reduction in the annual timber sale schedule in effect in one or more of the affected years.

Long-term increases in tree growth may be obtained by planting genetically improved trees. Genetic gain from the tree improvement program is included in the estimate of the forest biological capacity for wood production. Estimates of gain are based upon research done in the south and in other parts of the Pacific Northwest. Local studies are needed to accurately estimate expected growth increases under conditions and management practices that occur on the National Forest. Fertilizing to increase wood volume growth was not considered in volume growth projections because to date no studies have established that the practice would be economically feasible on the forest.

Firewood production is closely linked to overall timber harvest level. Timber harvesting creates wood waste in the form of limbs and cull logs that may be used by wood gatherers. Timber harvesting also creates public access to firewood.

CURRENT USES

Timber management on the National Forest is conducted under the 1969 Okanogan National Forest Timber Management Plan (as amended). This plan calls for an average volume of 86.5 million board feet (approximately 17.4 million cubic feet) of timber to be sold yearly. The volume sold includes 84.4 million board feet from mixed conifer standsand 2.1 million board feet of lodgepole pine stands (Table III-11 below). The volume offered for sale is based upon the commercial forest acres in the 1969 Timber Management Plan shown above in Table III-8 (as amended by the Washington State Wilderness Act of 1984).

TABLE III-11 Comparison of the 1969 Timber Management Plan, 1980 Resources Planning Act (RPA) harvest level with estimated National Forest Biological Capacity

	Annual Harvest Level		
Forest Stand Type	Biological Capacity	1969 TM Plan	RPA
	-Millions of Cubic Feet per Year-		
Mixed Conifer	18.3	17.0	---
Lodgepole	4.8	0.4	---
Low Productive	0.7	0.0	---
Total	23.8 1/	17.4	21 2/

1/ Long-term sustained yield capacity harvest level is not reached until the year 2130. Biological potential for the next ten years is 22.5 million cubic feet per year.

2/ The 1980 RPA program outputs are for 19 millions of cubic feet in Fiscal Year 1985, and 21 million cubic feet per year thereafter.

The Forest is presently departing from the even-flow policy in mixed conifer stands. While the 1969 Timber Management Plan (as amended) calls for an average annual harvest of 84.4 million board feet from mixed conifer stands, the Plan sustained yield level is actually 77.5 million board feet per year. The purpose of the departure under the 1969 Timber Management Plan has been to rapidly harvest mature stands in order to more quickly attain the even-flow harvest level.

Timber management practices vary on the National Forest. Intensive management practices such as precommercial thinning and commercial thinning generally occur only on comparatively gentle terrain. Approximately 54,000 acres have been precommercially thinned since the late 1960's. Present silvicultural practices include both intermediate harvests and regeneration cuts. Intermediate harvests include commercial thinnings, sanitation and salvage cuttings. Regeneration harvests include clearcutting, shelterwood cutting, seed tree cutting and harvest of mature trees in existing stands where an understory of young trees is present (Burns 1983). The harvest cutting methods selected must meet resource and vegetation management objectives defined in the Regional Guide and in other direction. Harvest cutting methods used in

specific areas are identified in environmental assessments or in silvicultural prescriptions written or reviewed by a certified silviculturist. About 20,000 acres have been regenerated by clearcutting, seed tree cutting and shelterwood cutting since 1979.

The make-up of existing mixed conifer stands is influenced by past harvesting practices on the Forest. Until recently, regeneration cuttings have been largely avoided. Extensive areas that have been repeatedly logged by partial cutting, sanitation or salvage cutting have removed much of the salable volume from large acreages leaving low vigor, poorly growing stands. Potential for future growth in these stands is poor. In many cases, past harvesting has created stands which contain many sizes and ages of trees. Because of disease, poor vigor, logging damage and the long-term effects of fire suppression, many of these stands will probably never produce salable volumes of wood. Fire suppression, in combination with cutting practices that removed ponderosa pine and western larch, have permitted Douglas-fir and true fir to occupy traditional "pine sites." In these stands, the cost of management per unit of wood harvested is high. In many cases, costs for logging and reforestation greatly exceed the value of remaining timber. Because of past reliance upon partial cutting, the forest has limited experience with regenerating stands growing at high elevations or in severe environments. While some research covering similar environments exists, very little work has been done locally.

Extensive stands of mature lodgepole pine occur on the forest. Until recently little lodgepole pine harvesting has been done. Existing stand types for the National Forest are shown in Table III-12.

TABLE III-12 Current Stand Class of Suitable Forest Acres Outside of Wilderness

	Forest Stand Type		
Stand Class	Mixed Conifer	Lodgepole	Total
	-------percent of acres-------		
Mature Sawlog/Poles	33	57	40
Mature Sawlog w/Immature Understory 1/	42	11	34
Immature Poles 1/	15	14	15
Seedlings and Saplings	3	16	6
Areas Needing Regeneration 2/	6	2	5

The Okanogan National Forest is developing a tree improvement program for Douglas-fir, western larch and ponderosa pine. The program involves selecting fast growing trees in the forest and collecting seed from them to use in developing seed orchards. Seed collected from these orchards will produce trees that will grow larger, faster and be more resistant to forest diseases than their more common kin. Increases in volume growth will be realized on acres planted with genetically improved seedlings. Because lodgepole pine will be regenerated naturally, the tree improvement program is applied only to mixed conifer stands.

Logging systems now used on the forest include ground yarding systems (tractors), cable yarding systems (skyline and highlead), and helicopters. Logging systems are prescribed based upon cost efficiency, road access, and other resource considerations such as soil stability or the impact of logging on the visual appearance of the forest. Most of past harvest activity has occurred on the more gentle slopes. Recent harvesting activity has increasingly been on steeper and less accessible terrain. Harvest systems presently in use may not be appropriate for small diameter material such as will be produced in future stands, and is presently found in lodgepole pine stands.

Few salvage sale opportunities exist because of low harvestable volumes per acre, small tree size and the scattered occurrence of trees killed by insects, disease, or other causes. Tree mortality has generally not been concentrated to the degree that has permitted economical salvage.

The majority of firewood produced by the National Forest results from timber management. Timber management activities create access to National Forest lands and create wood residues that may be used for firewood.

DEMAND

Previous projections of demand for Okanogan County have indicated consumption would remain stable (Bolsinger 1975) or increase markedly this decade (Haynes, Cannaughton and Adams 1980). Current demand for National Forest timber is low. During Fiscal Years 1982 and 1983, approximately 3 percent of the Okanogan National Forest annual programmed harvest was offered for sale but not sold. During Fiscal Year 1984, 29 percent of the annual programmed harvest was offered but not sold. Timber yields from other sources within the county are decreasing, which suggests demand for National Forest timber will improve (Hutchins 1981).

Long-term historical records indicate periodic adjustments in demand (measured by harvested volume) with a consistent upward trend (Hutchins 1981). Sources of demand uncertainty that have generally not been considered include future patterns of interest rates, changes in species and product mix, development of export markets, and the use of wood for energy. For these reasons national demand for wood products may decrease.

Production trends for the Northwest still have a long-term upward trend even with the assumption of reductions in wood scarcity (Adams and

Haynes 1985). Current manufacturing capacity in Okanogan County has been reduced somewhat with the closure of two sawmills. However, one newly constructed mill has just begun production. Additional planned construction of new facilities and expansion of existing mills should compensate for recent mill closures.

National Forest timber harvest levels are sensitive to regional and national economic conditions which determine the demand for forest products. The lack of correlation between timber sold, as opposed to timber harvested, and economic conditions is especially relevant for National Forest timber where buyers may defer their harvests when the economy slows.

Based upon current bidding patterns, existing local demand for lodgepole pine is poor west of the Okanogan River. Moderate demand for lodgepole pine east of the river is primarily from the Vaagen small-log mill located in Republic, Washington. Low timber values, small log sizes and lack of manufacturing facilities in Okanogan County are the cause of low demand for lodgepole pine west of the Okanogan River. Use of small size lodgepole pine in other areas of the west, especially in British Columbia, indicate markets are developing for the species. Based on this, demand for lodgepole pine should improve forest-wide during the coming decade.

The bidding pattern on the Okanogan shows much less competition for timber sales in the Methow Valley than in the Okanogan Valley. Bidders averaged approximately two per sale in the Methow Valley, compared to four bidders per sale in the Okanogan Valley from 1979 through 1983. For this same period the per thousand board feet overbid in the Methow Valley was $15 compared to $73 in the Okanogan Valley.

Old growth ponderosa pine is the most valuable timber species on the Okanogan National Forest. In the period 1979 through 1983, ponderosa pine represented 29 percent of the sell program, Douglas-fir and other conifers 70 percent, and lodgepole pine one percent. The average tree size on sales sold during the last two-year period was 217 board feet (43 cubic feet) per tree.

Local demand for firewood should increase. It may have already surpassed availability of traditional firewood material in some areas. Based upon 1983 and 1984 personal use and commercial firewood permit sales, demand for National Forest firewood is about 800,000 cubic feet (approximately 9,000 cords) per year. Data prior to 1983 are not available. The use of wood for home heating continues to be an attractive alternative or supplemental energy source in this area.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

In eastern Washington, the State Department of Natural Resources (DNR) is managing on the basis of a "relative even-flow harvest schedule." Permissible variation in the annual sell is 25 percent per decade which provides some assurance of a continuing log supply (FLMP 1983). In 1975, Bolsinger estimated about 17 to 18 million board feet per year as a projected annual allowable cut from DNR lands in Okanogan County.

The State is recalculating the harvest level for eastern Washington. Calculations should be completed by early 1986.

The Colville Confederated Tribes' annual allowable harvest has been increasing, and the Bureau of Indian Affairs projects 45 million board feet per year for Okanogan County (USDI 1985). Specific details of Tribal management plans are not finalized. Forest management practices have increased in intensity during the recent past.

Policies identified in the Okanogan County Conservation District Plan (1980) provide that forest lands be managed for multiple-use within their capabilities to the maximum. The plan also provides that forest products be maintained and enhanced for future generations and waste be brought to an absolute minimum.

The Bureau of Land Managment, U.S. Department of Interior manages its lands under a policy of sustained yield and even-flow. According to the Draft Spokane Resource Management Plan EIS dated October 1, 1984, the Bureau harvests approximately 4 million board feet per year from public lands in eastern Washington. Approximately 14 percent of the Bureau's productive forest land is in Okanogan County.

OPPORTUNITIES

Opportunities exist to bring vast acreages of the lodgepole pine stands under management. Lodgepole pine management can make a major contribution to the total amount of wood produced on the National Forest. Harvesting of lodgepole pine will also help forestall a major moutain pine beetle epidemic.

In all timber types, a large amount of less than sawlog size material is available for energy production, pulp and fiber products, and home-use fuelwood. Natural and catastrophic tree mortality, precommercial thinning, commercial harvests, and site preparation for reforestation are all sources of material. Development of local markets for small size material is of particular importance to management of the lodgepole pine type. Many lodgepole pine stands are stagnated and are unlikely to attain sufficient size to sell with current manufacturing technology. These stands may be cleared and young, vigorous stands may be established in their place. Precommercial thinning in young lodgepole pine stands can be done to insure trees will attain usable sizes. Efficient harvesting equipment and processing facilities could be encouraged to fully capture opportunities for lodgepole management.

Existing, poorly stocked, diseased mixed conifer stands which have low volume and have little prospect for acceptable growth may be regenerated to young vigorous stands.

Opportunities exist to use prescribed fire to accomplish silvicultural objectives of site preparation, disease control and stocking level control.

INSECTS, DISEASE AND ANIMAL DAMAGE

Serious insect and disease problems are present in many mature and over-mature timber stands on the Okanogan National Forest. Properly applied, accepted silvicultural practices can minimize or reduce volume and growth losses caused by insects and disease by developing stands of healthy, vigorous trees which are less susceptible to insect and disease attack. Management which develops a mosaic of stands of various age classes will also reduce the impact of forest insects. Insect and disease problems are intensified when stands have many age classes or contain multiple tree sizes. Historical cutting practices in mixed conifer stands have often increased the impact of insects and diseases (USDA 1980). Methods of accounting for yield reductions caused by insects, disease and animals are imperfect. Computer simulation models used to project timber yields account for endemic losses only. No adjustment to timber yields was made to account for possible future catastrophic losses due to fire, insects or disease.

INSECTS

Major insect pests on the Okanogan National Forest include bark beetles and defoliators.

Bark beetles have the potential to destroy more standing green timber than all other insects. Heavily stocked, dense stands of pole and saw-timber size trees are most susceptible to bark beetle attack. The average loss to bark beetles on the National Forest over the past 10 years has been estimated at nearly 300,000 cubic feet (1.5 million board feet) per year outside of wilderness. Large areas of mature lodgepole pine are highly susceptible to mountain pine beetle attack. Current losses to mountain pine beetle are low, but are expected to greatly increase in the absence of timber management. Forest entomologists have predicted mountain pine beetle will cause large volume losses in mature lodgepole pine stands within the next 10 years (USFS 1982).

Volume losses to defoliating insects are cyclic in nature. Between 1970 and 1980, an average of 123,000 acres per year were infested or reinfested by defoliating insects. Timber yields from severely infested stands may be reduced by as much as 17.2 cubic feet per acre per year because of growth losses and increased mortality (Western Spruce Budworm Loss Assessment Report 1982). This is about 40 percent of the growth in uninfested stands. Selection cutting and other practic es that create stands with multiple tree sizes favor the insect, and experience greatest volume losses (Carlson 1983).

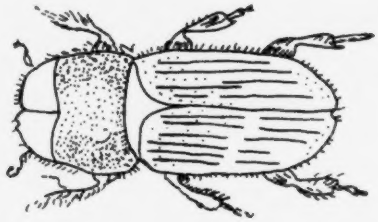
DISEASE

Forest diseases seriously affect the growth and yield of existing timber stands on the Okanogan National Forest. Although quantitative data are not available, dwarf mistletoe is probably the most serious forest disease in terms of growth loss, tree mortality, and acres infected. On the National Forest dwarf mistletoe infects Douglas-fir, western larch, lodgepole pine and ponderosa pine. Approximately 43 percent of the Douglas-fir stands and 47 percent of western larch stands are believed to be infected. Severely infected stands typically produce less than half the volume of healthy stands. Selection cutting and other practices that create stands with multiple tree sizes favor the disease and increase volume losses. The impacts of dwarf mistletoe can be reduced or eliminated by accepted silvicultural practices (Dixon and Hawksworth 1979).

The extent of root rot infections on the National Forest is not known. Root rots are caused by fungi which attack the lower stem and root systems of trees. Recent work by silviculturists and pathologists indicates laminated root rot and armallaria rot are much more prevalent on the National Forest than had previously been suspected. As much as 5 percent of Douglas-fir and true fir stands may be infected by root rots (USFS 1980). The major host species are Douglas-fir, true firs and western larch. Pine species are not affected as much. Volume losses from root rots tend to increase as successive stands of susceptible species are grown on the same piece of ground (Tkacz and Hansen 1982).

ANIMAL DAMAGE

Serious damage to forest trees caused by animals is believed to be low at this time. Quantitative data are not available. Animals kill or injure trees by feeding on foliage, buds, stems or roots. They also damage trees by trampling or rubbing on them, tearing the bark or breaking the stems. The majority of damage occurs in immature stands of seedlings, saplings and small poles. Most damage is likely to be caused by pocket gophers (*Thomomys* spp.) and porcupines (*Erethizon dorsatum*). The likelihood of serious damage to seedlings and saplings is greatest in stands reforested by planted seedlings. Losses in stands regenerated by natural seedlings are often less serious. Birds and small mammals may consume large quantities of tree seed. This may inhibit successful natural regeneration in some areas. Losses caused by domestic livestock and deer (*Odocoileus* spp.) are not known, but are probably localized and confined to young seedlings. During 1984 over 800 acres of gopher damaged plantations were identified on the Tonasket Ranger District.



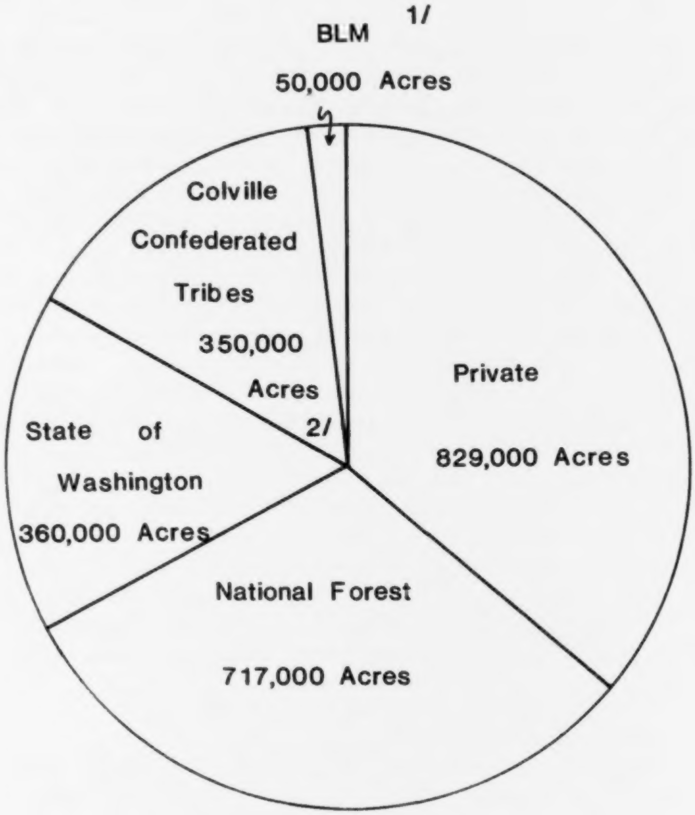
Mountain Pine Beetle

RANGE

Okanogan National Forest vegetation is approximately 58 percent open mixed conifer forest with the major livestock forage being pinegrass. The more southerly exposures support ponderosa pine, Idaho fescue and other bunchgrasses. Open rangelands of bunchgrasses make up only about 9 percent of the National Forest. A large area of the forest (228,900 acres - 32 percent) is dense timber with no significant forage understory. This however has potential for transitory production of forage (See Figure III-6).

Approximately 25 percent of Okanogan County's forage production (as measured in AUM's) is produced on this National Forest. An AUM (animal unit month) is the amount of feed or forage required by an animal unit for one month. An animal unit could be one cow, a cow-calf, etc. The AUM is not to be confused with an AM (animal month). An AM is one month's time on the range by one animal unit.

FIGURE III-5 Grazable Lands in Okanogan County (adapted from Okanogan County Conservation District - Program for the 1980's)



1/ Bureau of Land Management, U.S. Department of Interior

2/ Estimate

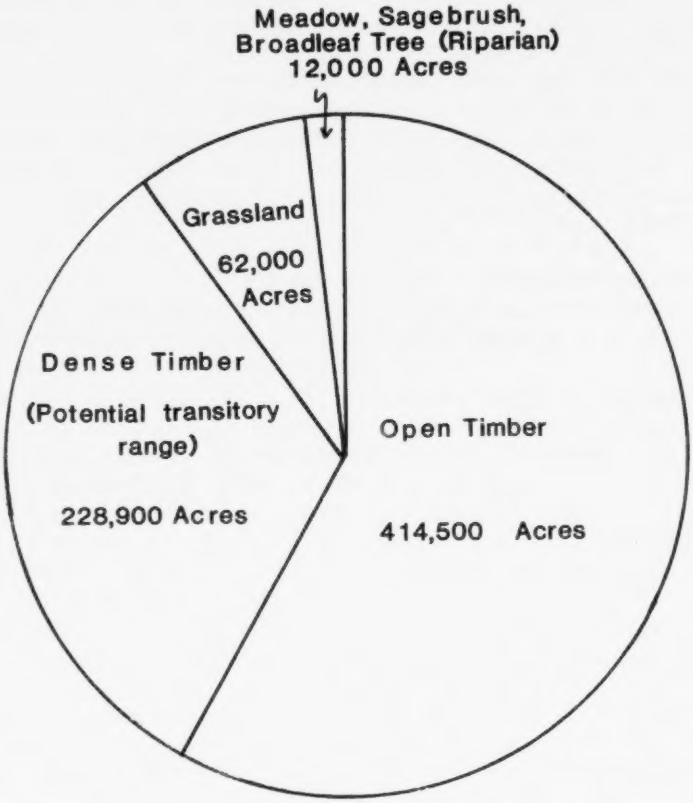
Approximately 43 percent of National Forest acres are grazable land. Existing grazable lands are those with at least 50 pounds of palatable forage per acre. The potential grazable land is presently covered with dense timber which if logged will produce forage, or grassland areas presently inaccessible because of dense timber. The latter could be made accessible by timber sales removing the barrier or by cutting animal trails through the stands. The largest share of these acres consist of timbered range types (Figure III-6). Grasslands, meadows and broadleaf tree types provide the greatest per acre forage production and are commonly the areas most intensively grazed.

None of the Forests rangelands are classed in unsatisfactory condition that will require range rehabilitation. Generally the rangelands are in an upward trend. A few allotments are static in range trend.

Approximately 57 percent of the National Forest in grazing allotments is classified as unsuitable for range forage utilization. Unsuitability can be because of numerous factors but most commonly are: (1) dense timber with no understory vegetation; (2) high elevation or steep slopes; (3) inaccessibility; (4) water bodies; or (5) rock. Because these areas are inclusions in suitable range, it is only practical to include them within an allotment boundary. Unsuitable range is defined as range which: (1) produces less than 50 pounds of forage per acre per year; (2) cannot be grazed on a sustained-yield basis; or (3) cannot feasibly be made accessible for use by livestock.

Of the 626,220 acres in wilderness, 197,870 acres are within allotments. Only a small part of those are grazed because of inaccessiblity or lack of forage because of dense timber, rock, etc.

FIGURE III-6 Extent of Grazable Vegetative Types on the National Forest



SUPPLY POTENTIAL

Okanogan National Forest lands have the ability to provide varying levels of forage production [as measured in Animal Unit Months (AUM's)] depending on land allocations, management practices and timber harvest levels. The National Forest has an estimated biological capacity to produce a maximum of 82,500 AUM's of forage per year for livestock. This biological capacity can only be realized through: (1) intensive range management, including fencing and water developments to optimize forage utilization relative to current levels; (2) high intensity timber management on nearly all commercial forest lands to maximize transitory range values. This is achieved by stocking level control to retard crown closure, which maintains understory production; and (3) range forage improvement projects such as prescribed burning and seeding of domestic grasses on suitable sites.

CURRENT USES

Current management practices and land allocations produce an estimated 64,000 AUM's of grazing capacity per year (Table III-13), part of which is set aside for wildlife. This use generated $87,680 in 1985. The estimated current capacity does not include transitory range values because those values are not predictable. During 1985, 51,525 AUM's of grazing were used through permits.

The Okanogan National Forest is divided into 66 grazing allotments, some of which include small tracts of state and private land. Thirty-two percent of the wilderness and eighty percent of the area outside wilderness are within grazing allotments. Most of the area not included in range allotments is unsuitable for forage production or has proved to be economically infeasible to manage for livestock grazing.

TABLE III-13 Current Grazing Allotment Acres and Carrying Capacity by District

District	N.F. Area in Allotments	Capacity
	acres	AUM's
Tonasket	385,683	37,100
Twisp	304,431	15,000
Winthrop	261,325	12,000
Total	951,439	64,000

Current livestock allotment strategies average between Levels "B" and "C." Level B management controls livestock numbers so that livestock use is within present grazing capacity. Level C management seeks full utilization of forage allocated to livestock.

DEMAND

Requests for additional permitted AUM's by both ranchers currently holding permits, and by ranchers who do not hold permits, indicate that demand for AUM's slightly exceeds current permitted National Forest production. Estimated current demand is for about 70,000 AUM's per year (estimate is from Forest Range Staff knowledge of demand from past fifteen years experience). Unless grazing policies on other local, federal, state and tribal landholdings are altered, forage demand is expected to remain relatively constant in the near future. Estimates show that increasing permitted AUM's on existing allotments to the allotment carrying capacities could adequately fulfill the present demonstrated demand for forage production.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The Okanogan County Conservation District Long-Range Resource Plan (1980) policy is to improve the rangeland resource through more intensive management, and maintain these lands in a productive condition to maximize forage production and other values. The plan calls for the preservation of prime farmland for the future, to the extent feasible. The plan recognizes that enhancement of the range livestock industry in Okanogan County will provide continued livelihood and treasured lifestyle for those directly involved, and will benefit the county economically from the contribution of the livestock industry. This policy supports the National Forest's goal to "achieve and maintain a quality range program."

OPPORTUNITIES

Increased forage production can be realized through utilization of transitory range created by timber harvest activities. Production measurements by National Forest range personnel indicate large increases are possible in short-term forage production on timbered ranges if forest vegetation is removed.

Streamside damage by livestock may be reduced by stock management practices that help disperse animals or direct them from riparian areas. These practices include the use of stock riders and barriers, and locating watering, salting and feeding areas away from riparian areas.

Prescribed fire is a valuable tool for improving range forage. Fire can be used to remove old, unpalatable forage and in turn adds nutrients to the soil. Another use of fire is to remove or reduce debris created by logging or timber stand improvement projects that hinder livestock access to forage.

NOXIOUS WEEDS

Noxious Weeds

Noxious weeds are those plant species that are undesirable because they conflict, restrict or otherwise cause problems under management objectives. Noxious weed invasion is substantial in Washington, resulting in current crop losses of about $65,000,000 (Penhallegon 1983). Eastern Washington has over 75 percent of the states infested acreage. Over 10 percent of Okanogan County is estimated to be infested. The Okanogan County Weed Control Board was established in 1979 at the urging of cattle ranchers in the County, specifically the Okanogan County Cattlemen's Association. The board has developed noxious weed lists which include an enforcement list for the County. This list is updated annually but the 1985 list follows:

Musk Thistle
Scotch Thistle
Leafy Spurge
Rush Skeletonweed
Tansy Ragwort
Knapweed Species

Several of the weeds on the County weed list and enforcement list are found within the National Forest boundaries.

Although weeds are currently not a serious range problem on the National Forest, they could be in the future. They are found on many road corridors, at trailheads where packers bring in hay containing weed seed, and adjacent to private land where noxious weeds are present. A notable exception is musk thistle, a weed new to the County which appears to be spreading rapidly in the northeastern portion of the County.

A potentially serious weed, tansy ragwort, is found in the forest. It is not currently listed by the County but is potentially serious enough that the National Forest has planned action in areas or taken action for control.

Very little is known about the ecological interactions of introduced plants (noxious weeds) and native vegetation. The potential for invasion onto National Forest lands following soil disturbing activities has yet to be determined. Based upon our experience, dryer, warmer sites on the forest appear to be more susceptible to invasion than cooler, moist areas.

Until the recent federal court injunction against the Forest Service, which stopped all use of herbicide chemicals, the forest was taking aggressive action in cooperation with the county on the northeast portion of the National Forest.

Current control measures are limited to biological and mechanical treatment. The success of each of these measures is dependent upon the species and extent of infestation.

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

The Okanogan County Weed Board, established by the County Commissioners, has taken an aggressive posture toward control of noxious farm weeds on all lands within the County. The above discussed injunction against the Forest Service in Region 6 (Oregon and Washington) enjoins the Forest Service from the use of pesticides until a "worst case analysis" is

completed. This prevents the Forest Service from controlling noxious weeds in an effective manner, and may place the Forest Service in bad light with County officials, and adjacent private land owners who are required by the County to control noxious weeds on their property.

OPPORTUNITIES

Seeding grass on disturbed soil in a timely manner is the best prevention of noxious weeds invading a site. This will be used to the extent possible within the concept of multiple uses.

If the court injunction is lifted, allowing use of herbicides, aggressive action will be taken to eradicate noxious weeds on forest lands as budgeting allows.

The forest will continue the present involvement with universities and committees to find biological means to aid control.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

PLANTS

The U.S. Fish and Wildlife Service (1985) lists no endangered, threatened or candidate plant species that occur on the Okanogan National Forest. Sensitive plants (Table III-14) are found on-forest with 30 documented and 14 suspected to occur (USFS - Region 6 Sensitive Plant List, Revised March, 1985). Sensitive plants do not have the protection of the Endangered Species Act of 1973, as amended, but Forest Service policy requires that they be managed in such a manner to prevent the need for placement on the Federal list.

TABLE III-14 Sensitive Plants on the Okanogan National Forest

DOCUMENTED OCCURRENCE

SCIENTIFIC NAME	COMMON NAME
Agoseris elata	tall agoseris
Botrychium boreale	northern grape fern
Carex atrata atrosquama	blackened sedge
Carex atrata erecta	erect blackened sedge
Carex norvegica	Scandinavian sedge
Carex paupercula	poor sedge
Carex prionophylla	saw-leaved sedge
Carex saxatilis	russet sedge
Carex scirpoidea scirpoidea	Canadian single-spike sedge
Chrysosplenium tetrandrum	northern golden-carpet
Cryptograma stelleri	Steller's rockbrake
Dodecatheon pulchellum watsonii	few-flowered shooting star
Draba aurea	golden draba
Draba lanceolata	lance-leaved draba
Eriophorum viridicarinatum	green keeled cotton-grass
Eritrichium nanum elongatum	pale alpine-forget-me-not
Listera borealis	northern twayblade
Mimulus suksdorfii	Suksdorf's monkey-flower
Mimulus washingtonensis	Washington monkey-flower
Parnassia kotzebuei	Kotzebue's grass-of-Parnassus
Platanthera obtusata	small northern bog-orchid
Poa grayana	Gray's bluegrass
Polemonium viscosum	skunk polemonium
Potentilla nivea	snow cinquefoil
Salix tweedyi	Tweedy's willow
Sanicula marilandica	black snake-root
Saxifraga cernua	nodding saxifrage
Saxifraga debilis	pygmy saxifrage
Saxifraga integrifolia apetala	swamp saxifrage
Vaccinium myrtilloides	blueberry

SUSPECTED OCCURRENCE

SCIENTIFIC NAME	COMMON NAME
Agrostis borealis	northern bentgrass
Botrychium lunaris onondagese	moonwort
Calamagrostis crassiglumis	thickglume reedgrass
Carex hystricina	porcupine sedge
Cypripedium calceolus parviflorum	yellow lady's slipper
Epipactis gigantea	giant helleborine
Geum rivale	water (purple) avens
Mimulus pulsiferae	Pulsifer's monkey-flower
Phacelia franklinii	Franklin's phacelia
Potentilla diversifolia perdissecta	diverse-leaved cinquefoil
Potentilla quinquefolia	five-leaved cinquefoil
Ribes irriguum	Idaho gooseberry
Rubus acaulis	nagoonberry
Teucrium canadense viscidum	woodsage

ANIMALS

Species that are federally listed as endangered and threatened and are thought to occur on the Okanogan National Forest include the grizzly bear and bald eagle. Neither of these species is known to reproduce on the National Forest, and both are considered infrequent visitors. No National Forest habitats have been identifed as essential or critical to maintaining their populations. Status of grizzly bear occurrence and potential of habitat ot support viable populations is not known. Bald eagles are migrants and are seen during winter. The peregrine falcon, a species recently delisted by the U.S. Fish and Wildlife Service on the Okanogan National Forest, is considered a "passover" which is only occasionally seen in migration. The gray wolf, a threatened species, was brought up as a public issue, but is not known to occur on the Forest.

Six species that infrequently occur on the National Forest are listed as sensitive by the Forest Service. These are Swainson's hawk, ferruginous hawk, Columbian sharp-tailed grouse, long billed curlew, western spotted frog and wolverine. The spotted frog is known to inhabit certain lakes, and the Swainsons's hawk is sometimes seen during migration. Reports of wolverines are rare, with the Pasayten Wilderness and other rugged western extremes of the National Forest their most likely habitats. The other sensitive species occupy habitats that generally do not occur on the Okanogan National Forest.

Threatened,
Endangered &
Sensitive Species

The spotted owl, a sensitive species, also occurs on the National Forest. To date only one pair has been verified, even though several unverified sightings have been reported. Most likely habitat is within the Pasayten Wilderness and the North Cascades Scenic Highway areas, where the natural habitat is undisturbed. Potential habitat quality and quantity is considered to be marginal at best, in relation to Regional Minimum Management Requirements for spotted owl habitat. Efforts are continuing to ascertain whether or not spotted owls frequent the Okanogan National Forest, or whether the previous occurrence of a single pair was an unusual happening beyond the normal range of the spotted owl.

RESEARCH NATURAL AREAS

Research Natural Areas (RNA's) contain examples of typical natural ecosystems or unique kinds of vegetation, animals and land which are reserved for scientific and educational use. Natural ecosystems, representing several ecological cells not presently represented in the RNA program, occur on the National Forest (Dyrness and others 1975). Two areas have been proposed for inclusion in the RNA program to provide representation of several ecological cells (Franklin 1980).

WOLF CREEK

The 150-acre Wolf Creek RNA established in 1969 provides an example of the bitterbrush/bunchgrass community. In addition, other communities are represented in the area (Franklin and others 1972).

TIFFANY MOUNTAIN

The Tiffany Mountain area was first proposed as an RNA in 1973 and has been recognized for its unusual scenic and botanical values. It is within a current grazing allotment and some dispersed recreation use does occur. Neither the recreation nor grazing use affects the area's value as a Research Natural Area.

The combination of a large number of ecologic cells not represented in the RNA system, their juxtaposition to each other and the variety of sensitive and endemic plant species make Tiffany Mountain unique. The preliminary establishment report states: "There are probably no comparable areas in the eastern slopes province of the Washington Cascades which are in a more pristine state than the Tiffany Area" (Elvander 1979). The area proposed encompasses approximately 3,000 acres. The boundary essentially follows legal land survey subdivisions. The final establishment report could adjust these boundaries to topographic features to facilitate administration.

The proposed area includes six ecological cells identified with "Research Natural Area Needs in the Pacific Northwest" (Dyrness and others 1975). Especially notable is the inclusion of three aquatic ecological cells in good condition. Representative aquatic cells are difficult to locate because of the amount of disturbance usually associated with these ecosystems.

The inclusion of the large number of highly desirable cells necessitates the relatively large acreages involved. In addition, it is judged easier to administer a large Research Natural Area that fills a variety of ecological cells than to administer many small, disjunct RNA's each representing one or two ecological cells.

No known mineral resources occur within this proposed RNA.

Approximately 1,000 acres of land suitable for timber production is found within this RNA. The majority of the timber is Engelmann spruce, subalpine fir and lodgepole pine. Suitable lands lie primarily in the lower portion of the RNA, and on more sheltered, northerly aspects.

MAPLE MOUNTAIN

The Maple Mountain area was proposed as an RNA in 1979. Three alternatives were considered. Alternative A was approximately 820 acres of rugged area, largely forested, which includes a minor stream drainage. Alternative B covered 570 acres with more than 25 percent of the area in non-forested openings. The third alternative was to combine the two areas for a total of nearly 1,400 acres. The combined unit was recommended because it includes more ecological cells than either of the units separately. These cells are not adequately represented within established RNA's in the Okanogan Highlands physiographic province. There are no other areas suitable for RNA status within the Okanogan National Forest with representatives of these cells.

The proposed Maple Mountain RNA contains examples of at least seven ecological cells listed in "Research Natural Area Needs in the Pacific Northwest" (Dyrness and others 1975). In addition, the endemic plant *Talinum okanoganense* is found within the proposed RNA.

The rugged nature of the area has kept the area in relatively undisturbed condition. Grazing use has been light and no logging has occurred. The area contains approximately 1,000 acres of suitable forest land. Timber volume has been offered for sale in the past, but sales have not sold because of high costs of developing access.

The combination of several cells, the inclusion of a stream drainage, an endemic plant, and undisturbed condition make the Maple Mountain area an excellent candidate for a Research Natural Area. In addition, it is located near the western extensions of the range of mallow ninebark and rough fescue. This feature lends the area to the study of the dynamics of range extension or reduction of widespread Rocky Mountain plant species.

Current recreation use is limited.

The proposed Maple Mountain Research Natural Area contains no known mineral deposits; however, the area has been heavily prospected in the past.

WILDLIFE AND FISH

About 400 species of terrestrial wildlife and 22 species of fish inhabit the Okanogan National Forest and are dependent on a wide variety of habitats. Unless otherwise qualified, the term "wildlife" refers to all forms of animals including fish, amphibians, reptiles, birds and mammals throughout this statement. The number of dependent wildlife species which occur in various habitats is shown in Table III-15.

TABLE III-15 Numbers of Wildlife Species Which Occur in National Forest Habitats 1/

Preferred Habitat	Fish	Amphibians	Reptiles	Mammals	Birds	Total
	numbers of species					
Riparian/Aquatic	22	12	4	36	136	210
Grassland/Meadow	--	--	6	22	55	83
Shrubland	--	--	10	24	75	109
Deciduous Forest	--	--	--	13	64	77
Mixed Coniferous Forest	--	--	3	38	79	120
Subalpine Forest	--	--	--	28	51	79
Alpine Meadow	--	--	--	24	21	45
Rocks/Cliffs/Talus	--	--	4	44	43	91

1/ From "Wildlife of the Okanogan National Forest; Habitat Requirements and Management Guidelines" 1977 and Ken Williams 1985.

The National Forest provides a great diversity of habitat types naturally because of vegetational patterns. What follows is a discussion of several key wildlife habitats and the indicator species that depend on them. Management indicators are selected wildlife species whose population changes are believed to indicate the effects of National Forest management activities, and are presumed to indicate the welfare of other wildlife that use similar habitats. These habitats include mature and old growth forests, dead and defective trees, deer winter range, deciduous and riparian areas, and lodgepole (Table III-16).

TABLE III-16 Wildlife Indicator Species and Limiting Habitats

Wildlife Indicator Species	Limiting Habitats
marten pileated woodpecker three-toed woodpecker	Mature or old growth timber
barred owl	Old growth and mature timber
spotted owl	Old growth timber
primary cavity excavators (10 species of woodpeckers)	Dead and defective trees
mule deer	Winter range
ruffed grouse anadromous fish resident trout	Deciduous (grouse) and riparian (grouse and fish)
lynx	Lodgepole

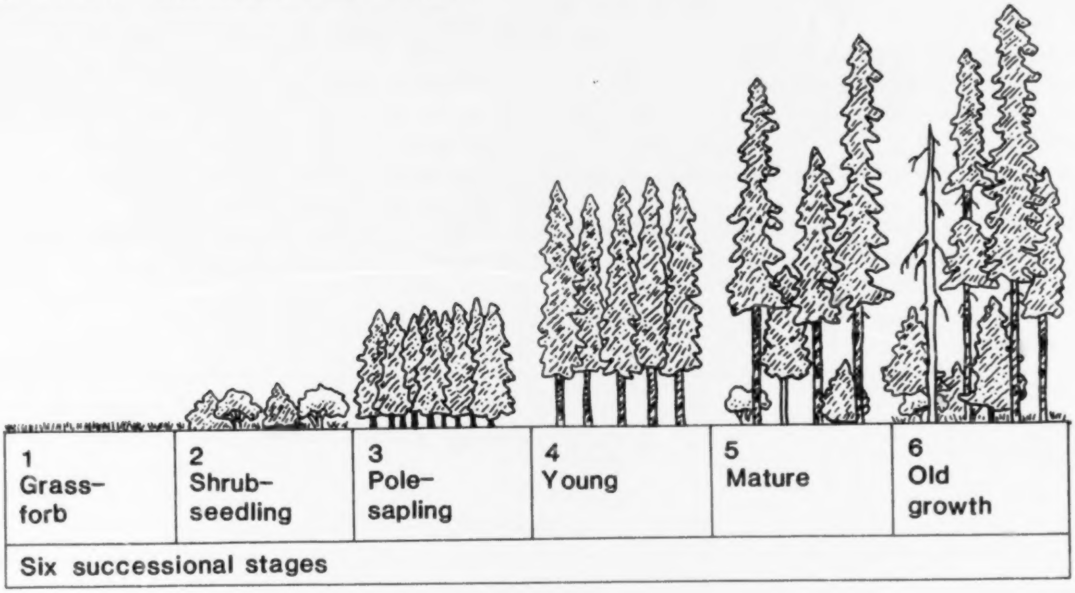
SUPPLY

Deer Habitat

The mule deer is the most abundant and popular big game animal in the area. Annual estimates of the population on the National Forest since 1980 average approximately 28,500 deer. Annual harvests from the National Forest have averaged approximately 4,000 mule deer, accounting for about 8 percent of the total harvest in the State of Washington. In addition, white-tailed deer numbers are estimated to average 2,100 over the last 5 years with annual harvest about 300 animals (Okanogan National Forest Annual Wildlife and Fisheries Reports 1980-1984 and Washington Department of Game Status Reports 1980-1984).

Mule deer are generally dispersed throughout the mid-to-high elevations during the summer and fall, and are restricted to smaller areas at lower elevations during the winter and early spring. Winter range areas have been identified as the habitat most critical to maintaining deer populations in the Methow and Okanogan Valleys (Ziegler 1978; see Wildlife Inventory Resource Map in the map package). Suitable winter range consists of lands that provide forage interspersed with areas of dense forest cover that provide protection from the cold. The spatial distribution of forage and thermal protection areas is critical in determining suitability of winter range areas. In the Methow Valley, vast areas of bitterbrush and sagebrush are found at lower elevations and provide an important, available winter food source, but snow intercept/thermal (SIT) cover is lacking on several wintering areas. SIT cover consists of multistoried stands of evergreen trees that intercept snow, provide protection from the cold and provide forage (see Figure III-7 for an illustration of SIT cover, shown as old growth and mature successional stages).

FIGURE III-7 Successional Stages



East of the Okanogan River, separation of summer and winter ranges is less distinct, concentrations of shrubs are lacking and SIT cover is often insufficient.

An estimated 241,000 acres on the National Forest have been identified as potential mule deer wintering areas. Represented on the National Forest is about 48 percent of the usable deer winter range in the Methow Valley (Ziegler 1978), and 70 percent of usable winter range east of the Okanogan River. The other deer winter range is located on lands of other ownership (Jerry King 1981).

About 18 percent of deer winter range acres are currently providing the critical snow intercept/thermal protection required on mule deer wintering areas. Forest estimates indicate that at least 15 percent, and more optimally 20-30 percent, of the area needs to be providing SIT protection to meet mule deer needs.

Deer habitat on the National Forest is increasingly important because of development in winter ranges on private land particularly in the Methow Valley. Pressure is increasing for the Okanogan National Forest to provide more deer habitat as habitat, is reduced on private lands.

Year-round forage condition and amount are adequate for existing deer herds. Conflicts with livestock are localized and minor.

Old Growth and Mature Habitat

The spotted owl and barred owl are indicators specifically for mixed coniferous old-growth habitat, with old-growth providing at least part of the habitat requirements. The pileated woodpecker and marten are indicators for mature or old-growth mixed conifer habitat, and the marten is also an indicator for mature or old-growth lodgepole pine habitat. The three-toed woodpecker is an indicator for these older stages in lodgepole pine types (including subalpine fir), and also associated with the spruce dominated portion of the mixed conifer type.

Two basic types of old growth, as defined by the Forest Service, Pacific Northwest Regional Plan, occur on the National Forest. Old growth mixed-conifer stands are some of the most productive habitat types for wildlife. This type is generally characterized by large (20"+) trees, snags and logs, multistoried canopies, and relatively high crown closures of the forest canopy (50%+) (see Figure III-7 depicting successional stages above). Stands of old growth timber are one of the hardest habitats to maintain when the forest is being managed to produce commercial timber. Occurrence of fire or logging generally eliminates one or more of the elements of an old growth stand. Lodgepole pine old growth is quite different from mixed conifer old growth, having smaller (6"+) trees, snags and logs with little structural diversity, and fewer species of wildlife supported (Wischnofske and others 1977).

Approximately 204,000 acres are currently classified as mixed conifer old growth on the entire National Forest, three-fourths of which is in wilderness. An estimated 37,000 acres of forest lands outside classified areas (wilderness and scenic) are providing old growth mixed-conifer habitat. Existing old growth is not evenly distributed throughout the National Forest.

Approximately 190,000 acres currently meet the criteria for old growth lodgepole pine (45% of the lodgepole type on the forest). About half of this old growth is within classified areas and half is outside. Outside wilderness, approximately 55% of the lodgepole acres that are suited for timber production are old growth lodgepole pine.

About 307,000 acres currently provide mature mixed conifer habitat, and 53,000 acres provide mature lodgepole pine habitat, forestwide.

Snag Habitat

A group of 10 woodpeckers are indicators for dead and defective trees, including the pileated, three-toed (both previously stated as old-growth/mature indicators), black-backed, downy, hairy, Lewis' and white-headed woodpeckers; yellow-bellied and Williamson's sapsuckers; and common flicker.

On the Okanogan National Forest, the distribution of cavity nester habitat is highly variable with high snag densities in certain areas and low densities elsewhere. Where snags occur at high densities, the territorial requirements of like species limit the population that can occur (Thomas ed. 1979).

An estimated 55 percent of the mixed conifer type outside of classified areas have snag levels to support at least 60 percent of maximum potential woodpecker populations. Other mixed conifer types are essentially devoid of snags where intensive snag falling associated with firewood gathering has occurred. Examples include areas adjacent to most roads and where cross-country vehicle access is possible, such as South Summit and the gentle lands east of the Okanogan River. Logged areas where clearcutting, cable logging, broadcast burning or helicopter logging have been employed have low snag levels.

Within classified areas, the conifer lands are estimated to support about 80 percent of maximum potential woodpecker population levels. Lodgepole types throughout the forest can support only about 10 percent of maximum woodpecker populations, primarily because of small (<10") snag sizes. The biological capacity does not exist to produce desirable snag sizes in most existing and unthinned lodgepole stands.

Large snags are the most valuable to wildlife because they are utilized by all snag-dependent species and can be substituted for smaller snags. Conversely, the needs of wildlife that require large diameter snags such as the pileated woodpecker cannot be fulfilled by smaller diameter snags.

Deciduous and Riparian Habitat

The ruffed grouse is the terrestrial indicator species of deciduous and riparian habitats. Different successional stages for breeding, nesting, brood rearding and sintering are important (Guillion 1984).

Deciduous vegetation and riparian zones provide the richest diversity of wildlife habitat on the National Forest (Table III-16). In these areas, the mixture of plant species is generally the most varied, abundant and productive of any habitat type. This habitat is essential to the ruffed grouse, resident trout and anadromous fish. Anadromous fish are those species of fish that spawn in fresh water and mature in salt water (e.g. steelhead and salmon). These areas are the primary fawning locations for mule deer. Many other species of wildlife are attracted to these areas because they require lush vegetation for forage, available water, dense cover for thermal protection, hiding, fawning and nesting. Numerous special habitats such as downed logs, standing snags, streams, ponds, marshes and edges of contrasting habitats are provided. Deciduous habitats are limited in amount on the Okanogan National Forest because of the dry conditions east of the Cascades.

Riparian includes areas of standing water, perennial or intermittent streams, and areas with a permanent high water table. Adjacent vegetation which requires large amounts of available water (e.g. willow, cottonwood and alder) is included within this zone.

Riparian areas on the Okanogan National Forest total 53,000 acres. This includes 25,000 acres adjacent to streams, 2,000 acres adjacent to lakes and 26,000 acres in moist and wet meadows.

Deciduous vegetation often occurs in riparian zones, but not exclusively. Aspen, for example, also occurs in small-sized stands outside of riparian areas scattered throughout the forest.

Fish Habitat

Anadromous fish and resident trout are aquatic indicator species for riparian habitats.

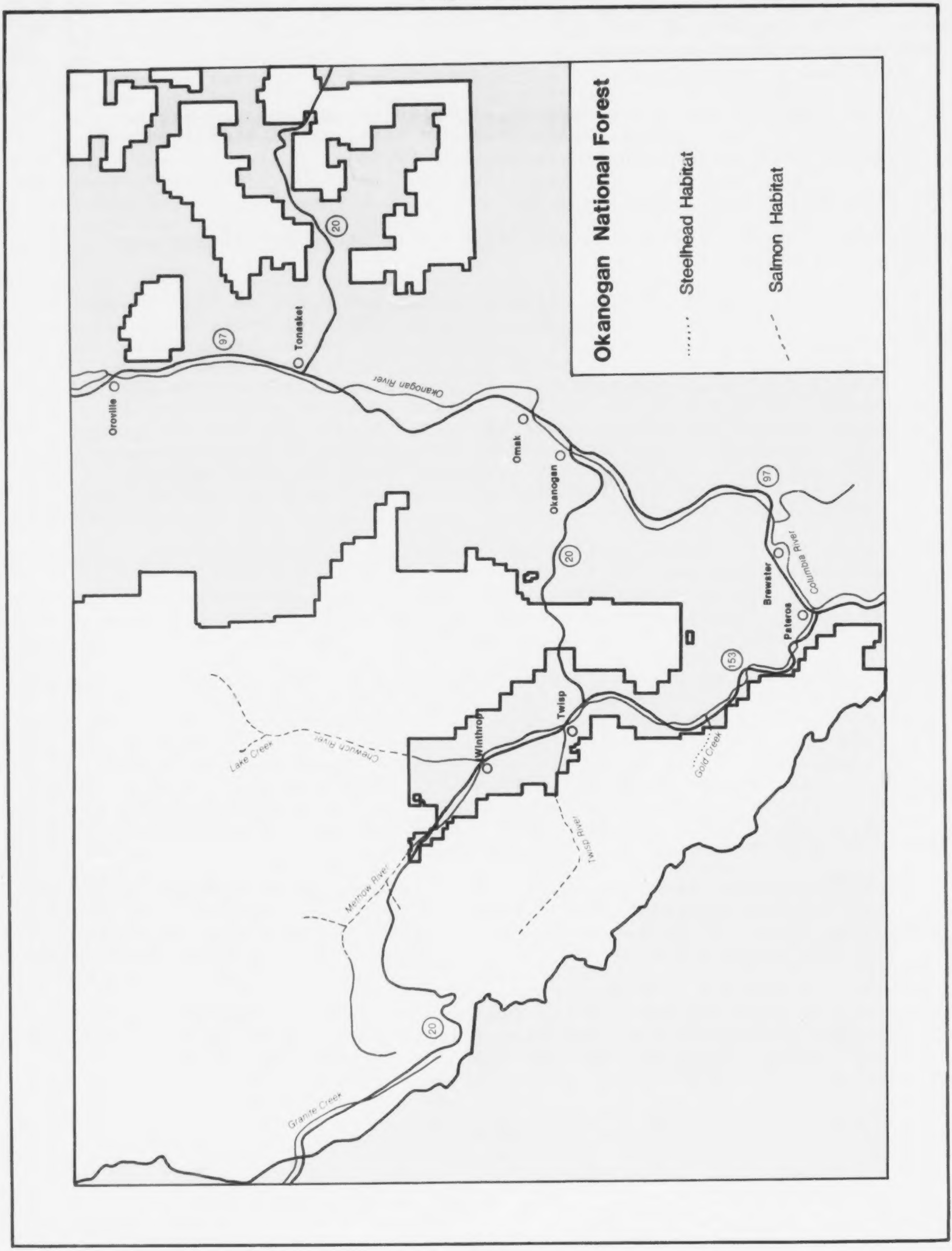
Fish are found in most rivers, streams, lakes and ponds on the National Forest. In the Methow River system, natural trout reproduction is sufficient to support substantial fisheries only in the headwaters, most of which occurs on the National Forest. With few exceptions streams have generally low productivity due to low temperatures and low food supply. Essentially all of the lowland lakes which are readily accessible require artificial stocking to maintain fisheries. Conversely, approximately two-thirds of the higher, less accessible lakes have naturally sustained trout populations. Existing natural production of 6-inch trout is estimated to be approximately 290,000 per year (Ken Williams 1981-85).

The larger, low elevation streams on the National Forest provide spawning and rearing habitat for anadromous fish (see Figure III-8). An estimated 22 miles of streams and rivers are used for salmon spawning, primarily by spring chinook. Few miles of stream are used by spawning steelhead.

Natural production of both salmon and steelhead is declining, primarily due to the extensive mortalities that juvenile fish suffer as they pass downstream through hydroelectric generating sites. Hydroelectric dams claim more than 20 percent of the juvenile fish per dam (Columbia River Fisheries Council 1981). Nine dams are present between the National Forest and the Pacific Ocean. In the Methow Valley, an excess of habitat is available for spawning and rearing. The Northwest Power Planning Council (1984) has proposals with the purpose of increasing anadromous fish runs.

The existing natural smolt production is estimated to be negligible for steelhead and approximately 40,000 salmon. Salmon production contributes about 200 fish (approximately 3600 pounds) which are caught by fishermen downstream or in the ocean. Potential smolt production is estimated to be 4,500 steelhead and 120,000 salmon. Potential could only be reached with sufficient numbers of returning adults to seed existing spawning and rearing habitat. Presently, habitat suitable for anadromous fish spawning and rearing is much greater than the needs of the remaining small populations (Ken Williams and John Easterbrooks 1981-1985).

Figure III-8


Okanogan National Forest
Steelhead Habitat
Salmon Habitat
Oroville
Tonasket
Omak
Okanogan
Brewster
Pateros
Twisp
Winthrop
97
20
153
Okanogan River
Columbia River
Lake Creek
Chewuch River
Gold Creek
Twisp River
Methow River
Granite Creek

Lodgepole Habitat

Lynx is the indicator species for lodgepole pine habitat.

Lodgepole pine types are estimated to occur on about 216,000 acres outside wilderness and scenic areas, and 210,000 acres within wilderness areas. A vast area above 4,500 feet elevation between Buck Pass and the Pasayten Wilderness has the highest reported density of lynx over the largest contiguous area in the lower 48 states (Brittell 1984). However, because of successional development to older, mostly mature stands less than 5% of this area now provides quality lynx habitat. Early successional stages provide forage and cover for the snowshoe hare. Lynx, a forest dweller that needs at least sapling-sized cover, depends largely on snowshoe hare for food. Overall, habitat quality can be improved and sustained through timber management which would diversify stand age conditions as long as road management is implemented to control access. Natural processes of insect epidemics and wildfire would tend to create more boom and bust periods for lynx and other wildlife.

Lodgepole pine is used by many other wildlife species including deer during the summer, snowshoe hare and three-toed woodpeckers. Vegetational diversity is presently low, with most lodgepole in an even-aged, mature, and closed forest condition.

Other Habitats

The foregoing discussion describes habitats that are key to the National Forest wildlife indicator species. Other wildlife game species of widespread interest include mountain goats, bighorn sheep, black bear, elk, moose, mountain lion and turkey.

Mountain goats are generally found in rocky terrain at or near timberline. About 47,000 acres have been inventoried as mountain goat habitat, 32,000 acres inside wilderness and 15,000 acres outside wilderness. Average estimates since 1980 are about 270 animals, with an annual harvest of 7 to 10. Population estimates have declined substantially in the last two decades. Reasons for declines are not apparent. Seasonal herd movements and key habitat components need to be better defined.

Bighorn sheep are yearlong residents on Mt. Hull, where topography is rugged and steep with interspersed stands of Douglas-fir, ponderosa pine and western larch; inventoried habitat in this area is about 4,900 acres. This resident herd, which was introduced in 1971 is now estimated to be approximately 50 animals, with past estimates ranging from 30 to 40 since 1980. A migrant herd occurs along the United States - Canada border in the Pasayten Wilderness and since 1980 has been estimated at 20 animals; inventoried habitat in this area is about 3,500 acres. The resident and migratory herds are not legally hunted.

Black bear are commonly found throughout the National Forest in a diverse variety of habitats. Since 1980, estimates of population averaged about 1,250 animals, with harvest averaging 110.

Elk and moose are infrequent visitors that wander from adjacent lands in small numbers.

Mountain lion are found in the lower to middle forested elevations, with deer and small mammals being the main prey species. Since 1980, estimates of population averaged approximately 265 animals with harvest averaging about 13 animals.

Turkey were introduced during 1972, but since 1980 no confirmed sightings have been reported.

CURRENT USES

The Okanogan National Forest provides numerous opportunities for hunting, fishing, and non-consumptive uses of wildlife, such as the viewing or photographing of animals.

TABLE III-17 Wildlife - Current Use 1/

Activity	Average Annual WFUDs 2/ (1980-1984)
Big Game Hunting	42,000
Upland Bird Hunting	6,000
Waterfowl Hunting	800
Small Game Hunting	500
Fishing	43,600
Non-consumptive Uses	5,000

1/ Recreation Management System 1980-1984.
2/ WFUDs = Wildlife/Fish User Days

DEMAND

The demand for all uses of wildlife is expected to continue to increase through the year 2000 (Washington State 1979). Table III-18 shows the expected demand to the years 1990 and 2000.

TABLE III-18 Wildlife - Projected Use 1/

	Average Annual WFUDs 2/	
Activity	1990	2000
Big Game Hunting	48,800	52,800
Upland Bird Hunting	6,600	7,100
Waterfowl Hunting	900	1,000
Small Game Hunting	700	800
Fishing	48,500	53,500
Non-consumptive Uses	6,000	6,700

1/ Recreation Management System 1980-1984.
2/ WFUDS = Wildlife/Fish User Days

PLANS, POLICIES AND CONTROLS OF OTHER AGENCIES

Other agencies directly affecting wildlife on the Okanogan National Forest include Washington State Departments of Game and Fisheries, Okanogan County, Colville Confederated Tribes and the USDI Fish and Wildlife Service.

Washington State Departments of Game and Fisheries are primarily responsible for managing the populations of wildlife and fish, while the Forest Service is primarily responsible for managing the habitats of wildlife and fish. The Washington State Game Department has established management goals for game and non-game species within the state [General Program Plans, April 1984: Wildlife Program Plans, April 1984; Fisheries Program Plans, April 1984; and Draft Region 2 Management Objectives]. In general, the Washington State Department of Game's wildlife goals are to increase or maintain current (1970-79) population levels, with emphasis on habitat protection and management. For mule and white-tailed deer, the state- wide goal is to maintain populations at current mean levels. The Washington State's draft Regional goal is also to maintain current mean population levels of both species of deer and establishes a goal of 46,000 mule deer in Region 2. Okanogan County provides the majority of the deer in Region 2. Region 2 includes Okanogan, Douglas, Grant, Adams and Franklin Counties. Habitat and population management on the Okanogan National Forest are key to meeting these goals.

The Forest Service consults with the USDI Fish and Wildlife Service concerning projects which may affect animals or plants listed as endangered or threatened. If necessary, projects are modified or deferred when the action would adversely affect such species. The Okanogan National Forest is in compliance with recovery plans for listed species.

The Okanogan National Forest coordinates with the Colville Confederated Tribe on projects of mutual concern.

OPPORTUNITIES

Opportunity is present to increase mule deer winter range quality on the National Forest. Thermal cover can at best be maintained when in low timber productivity areas, and increased where timber management activities have resulted in less than optimum levels. The high amount of vital deer winter range (see Wildlife and Fish SUPPLY section), which is increasing in importance due to off-forest development, can benefit from carefully designed timber and access management.

The opportunity exists to identify and manage certain timber stands for old growth habitat, to maintain required levels and optimize the dispersal of old growth on the National Forest. This includes treating younger stands in a manner to assure that future old growth will become available as soon as possible.

Overall wildlife habitat quality can be enhanced through consideration of forest-wide habitat diversity, implementation of site-specific habitat improvement projects and development of management direction for protection of special and unique wildlife habitats such as cliffs, snags and riparian zones.

Prescribed fire can be used to benefit wildlife habitat in deer winter ranges with bitterbrush (a primary browse species), in bighorn sheep and mountain goat habitats, and to supplement aspen regeneration.

Wildlife habitat diversity can be increased, especially for lynx and snowshoe hare populations, through carefully designed timber and access management in the lodgepole pine type.

The opportunity exists to maintain or improve the quality of fisheries habitat through management practices that minimize sedimentation and adverse alteration of habitat, and through potential habitat improvement projects designed to increase fisheries values.

ECONOMIC ENVIRONMENT

Wage and salary employment dominates in Okanogan County (83.4 percent of the total workforce in 1978), with many working at relatively low incomes ($8,183 per capita personal income in the county versus $8,553 for a state average). Individual proprietors, especially farmers, dominate county income totals, but employ relatively few people. Only a few farmers are in upper income brackets.

Agricultural employment has grown very slowly (0.2 percent from 1974 to 1978), while non-farm employment grew by over 72 percent (1974 to 1978). Employment and income levels are dominated by services, government, trade and forest products manufacturing (in descending order of importance). Unemployment rates have historically been high. For the period 1978-1985, Okanogan County unemployment rates have been about twice the state average. In 1984, the county unemployment rate was 17.1 percent versus the state average, 9.5 percent.

A detailed discussion of the economic setting can be found in Appendix B, Chapter V.

AGRICULTURAL ECONOMY

Agriculture is economically important and provides limited employment which fluctuates widely with the seasons. About 37 percent of the county was in farmland in 1978, less than during preceding years. Orchard growing and cattle ranching are the two major forms of agriculture in the county.

Although irrigated acres comprise less than 1.2 percent of the county land area, they make the greatest contribution to the agriculture economy. The apple industry contributes most to the county economy, bringing in more than $100 million annually in recent years.

TIMBER ECONOMY

Forest industries contribute a total of 80 to 85 million dollars annually to the county economy; second only to agriculture. Over 86 percent of logs harvested in the county are processed within Okanogan County, and about 98 percent of logs from the National Forest are processed within the Central Washington area.

There is a direct correlation between forest industry employment and timber harvested. Actual employment figures are not available, but total county forest industry employment is estimated at between 1,000 and 1,200 workers. Average annual employment in logging, sawmilling, veneer and plywood production per unit of wood consumed (harvested) has declined over time. This reflects the development of more efficient logging methods and milling (Hutchins 1981).

Over the past few years, manufacturing has declined and the service sector has increased. Nationally, timber is in a slump due to this general trend. National Forest receipts (Table III-8) demonstrate how shifts in national economic trends affect the industry at the local level: unstable, with great fluctuations from year to year.

RECREATION ECONOMY

Recreation is especially important in the Methow Valley and in the Conconully area. Recreation is of increasing importance in the Okanogan Valley. Only about eight percent of those recreationists living in North Central Washington leave to recreate elsewhere. Recreation facilities on federal lands account for about two-thirds of all recreation visits for people living in this area.

Actual National Forest recreational benefits to local economies are unknown, but the increase in leisure time and service industries is making recreation increase in importance. National Forest recreational opportunities which provide the greatest indirect benefits to local economies are hunting and fishing, wilderness recreation, and driving for pleasure.

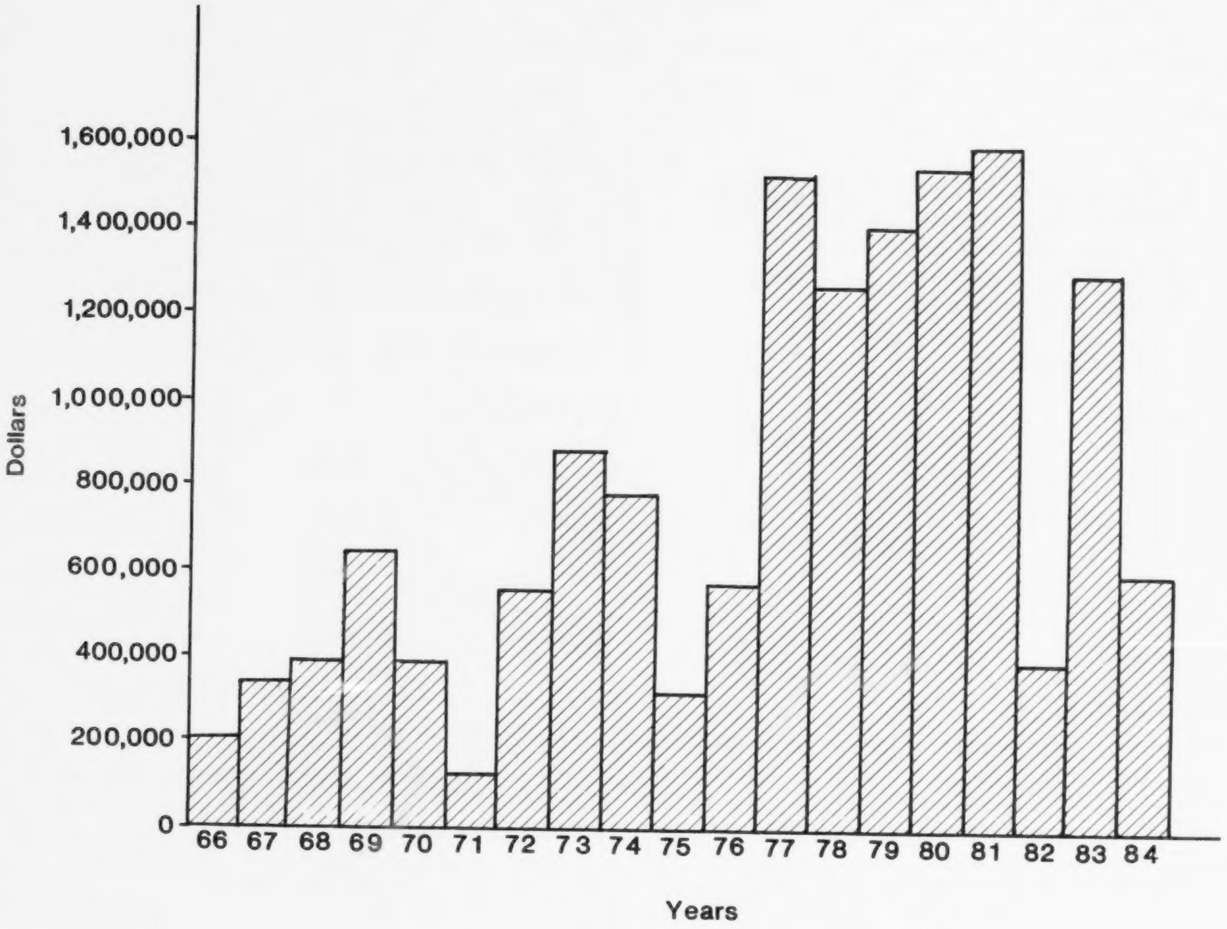
NATIONAL FOREST EXPENDITURES AND RETURNS

Twenty-five percent of the revenues collected by National Forests are returned to the states to be used for schools and roads in the counties where National Forests are located. The use of the portions of the Okanogan National Forest in Chelan, Whatcom and Skagit Counties does not generate revenues and, consequently, no receipts are returned to these counties from this National Forest.

Timber receipts have the greatest effect on the 25 percent payment to Okanogan County (Figure III-9). These receipts fluctuate as the timber harvest fluctuates. During recent years, this fluctuation has increased. This reflects the impacts of the national economic situation on the local timber sector economy. The timber industry continues to be unstable, and thus has an unstabling influence on the local economy.

Collections for the Knutson-Vandenburg Act funds (reforestation and thinning), road maintenance, brush disposal, and salvage sale funds are for the most part spent in the local economy. These collections, and thus expenditures, vary with the timber harvest.

FIGURE III-9 Okanogan County - 25% Road and School Fund - Receipts from Okanogan National Forest, 1966 - 1984 1/



1/ KV and road credits added to formula in 1977.

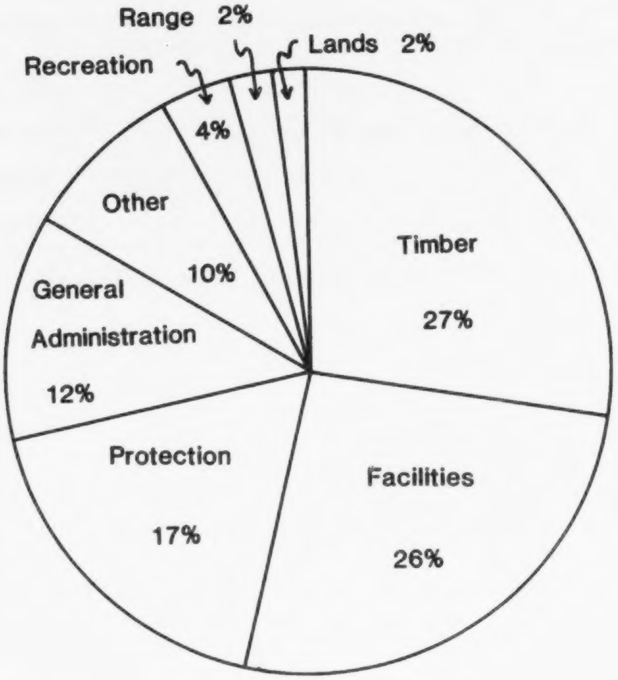
As previously stated, the timber sector of the local economy is second only to agriculture in Okanogan County. This is an unstable economic sector, thus contributing to instability in the local economy. This fluctuation eventually affects all sectors of the economy (Table III-19).

TABLE III-19 Okanogan National Forest Fiscal Year 1982-1984 Receipts

Receipt Type	<----- 1982	Dollars ----- 1983	-----> 1984
Timber			
U.S. Treasury	1,023,674	1,871,711	502,833
Knutson-Vandenburg Act Funds	131,491	1,201,739	1,308,982
Timber Purchaser Road Credit	311,675	1,966,892	525,426
Salvage Sale Funds	3,475	17,449	47,506
Road Maintenance	25,503	154,110	108,611
Brush Disposal	151,471	584,665	486,712
(Total)	(1,647,289)	(5,796,566)	(2,980,070)
Recreation	43,456	51,637	58,436
Grazing	82,537	63,923	61,026
Land Uses	5,317	4,697	4,342
Power	18	16	50
Minerals	15,856	26,363	43,377
Miscellaneous Receipts	15,354	30,197	13,829
TOTAL	1,809,827	5,973,399	3,161,130
25% Payment to Okanogan County	399,593	1,290,237	615,779

The current National Forest budget (fiscal year 1984) is 11.1 million dollars. Major expenditures include timber management, forest protection and facilities management (Figure III-10).

FIGURE III-10 Okanogan National Forest Fiscal Year 1984 Expenditures



BELOW - COST TIMBER SALES

The amount of timber harvested between 1980 and 1984, its value, and timber program costs are shown below in Table III-20. The value of timber harvested, net of road costs, exceeded total program costs for three of the last five years. During the last four years, 84 percent of the timber sales over 1.5 million board feet have been appraised as deficit (value of stumpage not sufficient to cover road costs, needed reforestation, and provide a minimum return to the Government). Despite this, 90 percent of sales appraised as deficit have been "bid up" during auction to the point that they at least cover the cost of roads, reforestation, and a minimum amount to the Treasury.

Whether a timber sale appraises deficit, or is below cost, is highly influenced by current market conditions, current costs of logging and related reforestation, and non-timber management objectives or constraints designed into the sale (Schuster and Jones, 1985). Examples of constraints that increase sale costs are logging season restrictions designed to prevent disruption of critical wildlife breeding periods, and special cutting practices which will protect scenic values. Mills et. al. (1985) reported that substantial economies to scale resulted from large harvest units over smaller units. Total treatment costs increase dramatically as harvest units decrease below about 75 acres in size.

In most instances the dollar returns from selling small sales for some products, such as posts, poles, or Christmas trees are exeeded by the costs of offering the sale. The sale of miscellaneous products may sometimes be used as a method of accomplishing work that would be more expensive to do by other means.

TABLE III-20 Timber Sale Costs and Receipts

	Timber Harvested 1/		Timber Sale 2/
Fiscal Year	Volume (Millions of Boardfeet)	Value (Thousands of Dollars)	Costs (Thousands of Dollars)
1980	75	5,103	1,978
1981	81	5,823	1,941
1982	19	616	2,232
1983	79	3,848	2,099
1984	55	1,895	3,881 3/

	Timber Sold 1/		Timber Offered 4/
Fiscal Year	Volume (Millions of Boardfeet)	Value (Thousands of Dollars)	Volume (Millions of Boardfeet)
1980	66	5,277	73
1981	80	6,407	80
1982	42	1,683	75
1983	106	4,843	79
1984	72	3,098	79

1/ Volume figures include all convertible products; value includes all products, including Christmas trees, etc. Value includes BD and K-V collections, purchaser credits, etc.

2/ Costs include all costs related to the timber sale program, including program management, sale preparation, administration, stand examination, etc. Road costs are not included in this figure.

3/ Fiscal Year 1984 costs are not directly comperable to costs from earlier years. Timber support costs (wildlife, recreation, etc.) were not included in timber sale program costs prior to Fiscal Year 1984.

4/ In some years the volume offered for sale was less than the allowable sale quantity, because of reduced budgets.

Road construction costs are shown below in Table III-21. Roads are shown separately because they represent a durable asset with a useful life far exceeding the length of a single timber sale. In addition, roads serve other Forest users by providing access to firewood, for recreation users, and for fire protection and for other Forest users.

TABLE III-21 Roading Costs Related to the Timber Sale Program

Fiscal Year	Asset Value 1/ (Thousands of Dollars)
1980	1,601
1981	2,001
1982	1,309
1983	2,340
1984	1,253

1/ Includes appropriated road construction, purchaser construction, engineering, design and inspection, etc.

Timber sales are the most effective tool we have to accomplish vegetation changes in the forest. For example, the sale of timber in high elevation lodgepole pine stands can greatly improve habitat for lynx, and greatly reduce future potential for insect attack. Because of poorly developed road systems, low species value, and a lack of appropriate manufacturing facilities, the cost of initial timber sale offerings in these stands will probably exceed returns.

SOCIAL ENVIRONMENT

The discussion about the social environment is divided into two major sections: the social setting and the recreation/leisure environment.

SOCIAL SETTING

Management of the Okanogan Forest has the "greatest relative significance to, and effect upon, people who conceptualize the Okanogan National Forest as home territory. Users from outside the county are considered to be more mobile, having the flexibility to alter their patterns of use to other forests or other areas within the forest" (Hutchins, 1981). While it is recognized that socio-economic effects extend beyond county borders, these exterior areas are less significantly affected and the effects more difficult to estimate.

Okanogan County is the largest county by area in Washington state, but is sparsely populated, ranking number 22 out of 39 counties, with 30,639 residents (USDC 1980). Densities are especially low in the Methow and Nespelem Valleys. The majority of the population remains concentrated in major towns and cities in the Okanogan Valley. Growth in Okanogan County is intermediate when compared to state averages. About 21 percent population growth occurred between 1970 and 1980. Growth between 1950 and 1970 switched from predominately rural areas to predominately urban areas, and then returned to predominately rural growth between 1970 and 1980.

Further discussion of the social setting can be found in Appendix B, Chapter V.

COMMUNITY CONTEXT, LIFESTYLES AND VALUES

The following is a discussion of social groups, identifying a few of their key lifestyles and values summarized from Okanogan National Forest Socio-Economic Study (Hutchins, 1981).

A portion of the county population consists of Old Timers or descendants of original Pioneers, often including their offspring in extended families. Most of these people have strong ties to the resource base; many having worked most of their lives primarily in agriculture and/or forest industries. Their values and lifestyles are generally conservative and traditional, often revolving around independence, hard physical labor and extended kinship ties. Many are feeling threatened by growth and change, particularly as brought on by the arrival of Newcomers.

County population growth during the last decade was due to the immigration to both incorporated and unincorporated areas. Many Newcomers have come from primarily urban backgrounds, but embrace the "rural way of life," having "escaped" from what they perceived as "city pressures." Consequently, many have readily embraced the traditional values they found here. Many Newcomers to these cities have retained more "urban" values and are generally less territorial. They are more accepting of the mixing and turnover in values and lifestyles generally associated with more urban lifestyles. But most still value their perception of the "small town life," with at least their perception of relative "tranquility, friendliness and security."

New Pioneers (often called "counter cultures") also "escaped from" primarily urban backgrounds. They generally reject traditional and conservative lifestyles and values of the other groups. They have a strong territorial sense for the natural resources. Most live in the hills and hanging valleys above the main Methow and Okanogan Valleys. Most are striving to pursue their non-traditional lifestyles and values and sense a need for at least limited social acceptance. They value hard work, but stay primarily within their own enclaves, rejecting more traditional socio-economic ties to the other groups.

ETHNIC MINORITIES

Ethnic minorities make up about 13 percent of the county population. According to the 1980 census, Native Americans represent the largest ethnic minority group at about 11 percent of the total county population (USDC 1980). Most of these Native Amercians are members of the Colville Confederated Tribes. Native Americans are a distinct social group, attaching special values to their land, its natural resources, independence and extended kinship ties. Unemployment rates have been significantly higher among ethnic minorities, and this has been especially true for Hispanics and Native Americans. All minorities, particularly Native Americans, have been disproportionately under-represented in blue collar and service occupations. Seasonal employment in agriculture and the forest industry has been especially important.

The American Indian Religious Freedom Act of 1978 establishes the need of protection and preservation for American Indians of their inherent right to freedom to believe, express and exercise their traditional religions. This includes the identification of geographical areas of religious significance. The Colville Confederated Tribes and the Okanogan National Forest have cooperatively, through the involvement of tribal elders, evaluated portions of the National Forest for sites. To date, no sites of religious significance have been identified on the National Forest (Fredin 1983).

The Colville Confederated Tribes have special hunting rights, guaranteed by the 1891 agreement with the United States and reinforced by the Supreme Court's 1975 Antoine Decision. These rights apply to National Forest lands on the Tonasket Ranger District, east of the Okanogan River. The Okanogan National Forest annually coordinate with the CCT and Washington Department of Game regarding programs of mutual interest or responsibilities. Coordination also occurs in timber management programs, employment, and other areas.

Migrant workers are not significant users of the Okanogan National Forest. Native Americans are affected by the Okanogan Forest's management, particularly in terms of factors such as fish and wildlife populations. Further detail can be found in Chapter IV, Environmental Consequences.

RECREATION/LEISURE

This subsection is divided into four parts: recreation, visual quality, wild/scenic/recreation rivers, and cultural resources.

RECREATION

Recreation opportunities on the Okanogan National Forest complement the activities provided throughout the rest of Okanogan County. The County is noted for its sunny, dry climate and clean air. Most of the communities are strongly emphasizing year-round recreation as an important economic base. This is evidenced by the world famous Omak Stampede and Suicide Race, and regional and statewide events such as "Sunny Okanogan Days," "Freeze Your Buns Run," and "S.T.O.K.E.R." Individual communities throughout the Okanogan and Methow valleys have popular rodeos during the summer. The community of Winthrop is noted for its adherence to a western motif. The Methow Valley is rapidly becoming known as the winter recreation paradise of the State of Washington.

The favorable climate, clean air and rich diversity of recreation opportunities annually attracts approximately 1.0 million visitor days to the Okanogan National Forest. People from all over the world visit the National Forest to view the spectacular scenery of the North Cascades. The National Forest is noted statewide for its mule deer hunting opportunities. Use by residents of Canada has especially increased since the opening of the North Cascades Highway, because a shorter weekend drive opportunity was created. The highway also shortens summer driving distance between the Seattle/Puget Sound population center and the National Forest. It is estimated that approximately 50 percent of the National Forest recreation use is from the Seattle/Puget Sound area.

Supply Potential

Recreation Opportunities

The recreation resource on the National Forest has been inventoried using the Recreation Opportunity Spectrum (ROS) (Recreation Opportunity Spectrum Resource Map). Appendix H explains the ROS system.

Most of the land east of the National Forest has been roaded and/or developed. Lands west of the National Forest administered by the National Park Service in the North Cascades National Park and the Lake Chelan and Ross Lake National Recreation Areas offer more primitive opportunities. Wenatchee National Forest lands west and south of the National Forest offer recreation opportunities ranging from primitive to more developed.

Developed site opportunities on lands of other ownership in Okanogan County are shown in Table III-22.

TABLE III-22 Inventory of Developed Sites and Capacities Provided by Other Entities in Okanogan County

	Campgrounds		Heritage Sites		Ski Areas	
Supplier	No.	No. of Units	No.	No. of Units	No.	Capacity
State parks	4	550	1	-	-	-
DNR 1/	7	87	-	-	-	-
Private	10	329	-	-	1	-
Game Department	Numerous Fisherman Parking Areas					

1/ Washington State Department of Natural Resources

The Okanogan National Forest has the potential to provide a variety of recreational opportunities, ranging from highly developed to more primitive. (Table III-23).

TABLE III-23 Inventoried Recreation Opportunities on the National Forest

	Recreation Opportunity				
Area	Primitive	Semi-prim Non-motorized	Semi-prim Motorized	Roaded Natural	RodMod Rural
	acres				
Pasayten Wilderness	430,800	99,200	-	-	-
Lake Chelan/Sawtooth	67,700	28,500	-	-	-
Non-wilderness	-	373,200	74,000	402,900	229,900
Total	498,000	500,900	64,000	402,900	229,900
Percent	30	29	4	24	13

Several areas are currently used for primitive and semi-primitive (motorized and non-motorized) recreation opportunities, including the Pasayten Wilderness, Lake Chelan/Sawtooth Wilderness, unroaded portion of the North Cascades Scenic Highway, Upper Methow River, Pasayten Rim, Tiffany Mountain and Bonaparte Mountain. These areas are characterized by steep slopes and high mountain peaks that limit access. This rugged terrain significantly decreases the accessibility of these areas by large numbers of people. Several additional unroaded areas have the potential to provide semi-primitive recreation opportunities. These include the Jackson Creek, Bodie Mountain, Toats Coulee, and 20 and 30-mile Meadow areas. These areas currently have limited use.

Existing areas on the Okanogan National Forest providing roaded natural recreation opportunities include the North Cascades Scenic Highway and Hart's Pass corridors, Five Lakes Area, Chewuch and Eight- mile corridors, North Fork Salmon Creek, Twisp River and Blackpine Lake, Loup Loup Highway, Crawfish Lake, Toats Coulee, and those portions of State Highway 20 and County Road 9455 which cross the Tonasket District. Most of the developed sites on the National Forest (Table III-24) are located in these areas.

Despite the fact that recreation is a secondary objective, some areas managed for timber or other uses receive high amounts of recreation use because of road access and relatively gentle topography.

TABLE III-24 Inventory of Existing Developed Recreation Sites on the National Forest

Type of Site	Number	Capacity Persons At One Time
Campground with Boating and Day Use Facilities	8	770
Campground Without Boating and Day Use Facilities	32	1610
Trailhead	13	440
Summer Home and Organization Site	7	735
Picnic Site	2	170
Interpretive and Observation Site	4	330
Downhill Ski Area	1	666
Sno Park	6	270
Documentary Site (Site on National Register of Historic Places)	1	5
Total	74	4996

Approximately 570 miles of trail are present outside wilderness. This includes six National Recreation Trails and 37 miles of the Pacific Crest National Scenic Trail (USDA 1981). About 335 miles of trail are in less than adequate condition or are unnecessary to meet resource objectives or to provide access. Approximately 260 miles of the total mileage are open to motorized trail vehicles without restrictions and 550 miles are open to horse use by the National Forest Travel Plan. Approximately 22 miles of trail open to motorized vehicles have been reconstructed with State of Washington Off-Road Vehicle funds. The Rainy Lake and Washington Pass Overlook trails were constructed with asphalt surfaces to accommodate use by the handicapped.

Winter Sports

The Loup Loup Ski Area is located on the Okanogan National Forest and provides day-use downhill skiing opportunities to the local population. Loup Loup is operated by the Loup Loup Ski Area Association under a special-use permit. The facility is relatlively small, having a capacity of about 665 skiers at one time. Operating season is generally short (averaging 65 days of operation/year over the past four years). This is due to the light snowfall at the elevation of the facility. Use at the site has remained stable at 10,700 skiers/year over the past four years. A Site Development Plan was approved in 1981. This plan would allow for installation of a chair lift, installation of water and improved sanitation facilities, clearing of additional runs and upgrading the base facilities. To date, few of the items authorized in the Site Development Plan have been completed because of the operator's lack of funding.

In July, 1984 the Regional Forester approved development of a Winter Sports Site at Early Winters based on a site specific Final Environmental Impact Statement. This approval authorizes use on approximately 3,900 acres of National Forest. Facilities would allow utilization by 8,200 skiers-at-one-time. The decision is currently under administrative appeal.

The Okanogan National Forest works closely with the Okanogan County Snowmobile Advisory Board, Methow Valley Ski Touring Association and the Okanogan Valley Nordic Ski Association to provide high quality snowmobiling and cross-country skiing opportunities.

The Snowmobile Advisory Board provides approximately 270 miles of groomed snowmobile routes along National Forest system roads in the Twisp River-Black Canyon, Starvation Mountain, 8-mile, Chewuch, Boulder Creek, Salmon Creek and Highway 20 areas. Of this total, 150 miles are groomed on a regular basis. Several trails tie into groomed snowmobile routes in Chelan County.

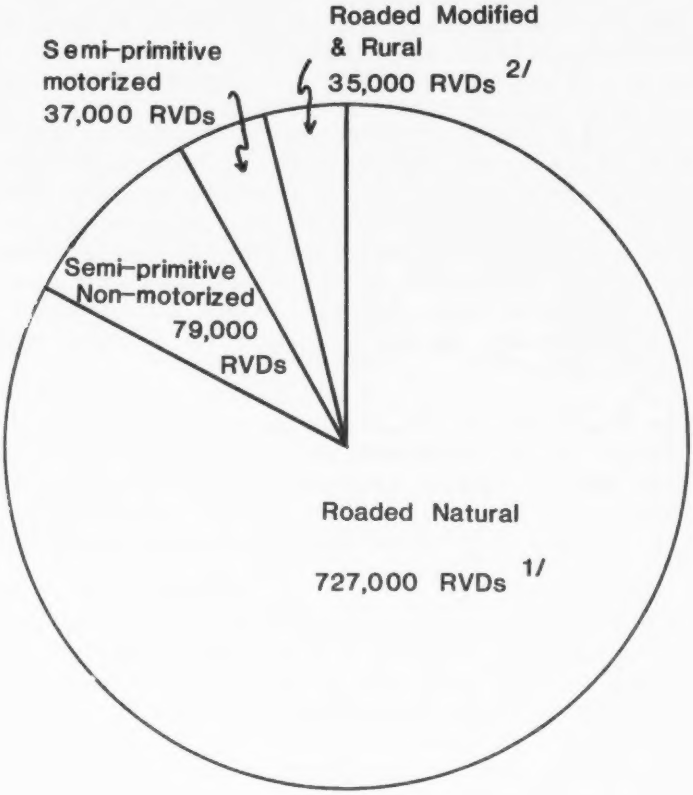
The Methow Valley Ski Touring Association and the Okanogan Valley Nordic Ski Association provide approximately 200 miles of cross-country ski trails in the Methow Valley and Loup Loup Summit areas. Of this total, approximately 75 miles are located on National Forest in the vicinity of Sun Mountain Lodge, Loup Loup Summit and Rendevous Pass.

Several outfitter-guides also provide a variety of winter sports activities, including helicopter skiing.

Current Uses

Average annual recreation use (1980-1984) outside wilderness on the National Forest has been 896,000 recreation visitor days (USDA 1980-1984). This use is distributed throughout the National Forest by recreation opportunity class (Figure III-11). The most common summer and fall uses are camping, viewing scenery, hiking, hunting, fishing and picnicking. Cross-country skiing, snowmobiling and helicopter

FIGURE III-11 Average Annual Non-Wilderness Recreation Visitor Days (RVD's) by Recreation Opportunity Class (1980-1984)



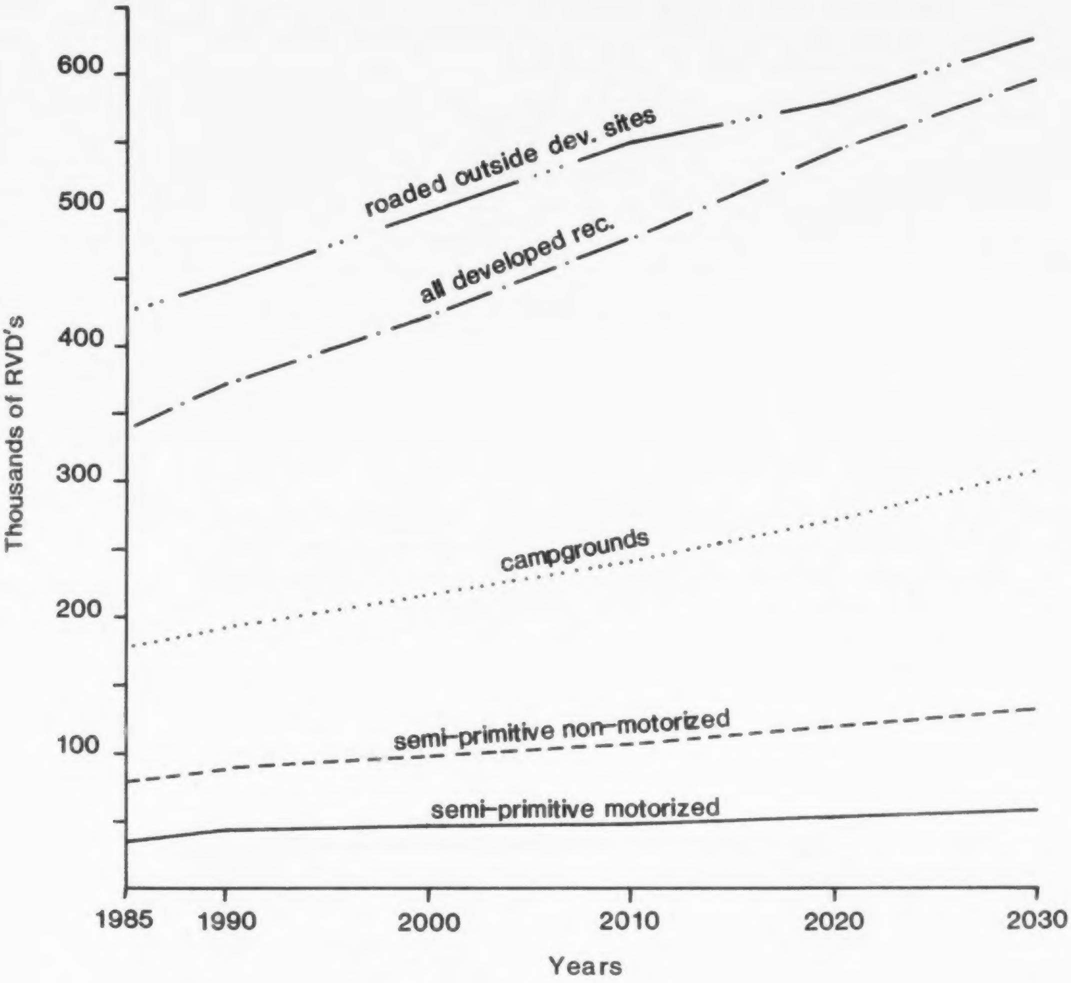
1/ Developed Sites: 325,000 RVDs and Outside Developed Sites: 402,000 RVDs.

2/ Developed Sites: 13,000 RVDs and Outside Developed Sites: 22,000 RVDs.

Demand

Demand for various types of recreation opportunities is expected to increase in the future. This is particularly true for winter sports activities and for activities dependent on an unroaded setting. Quantitative estimates of recreational demand are available for various recreation types to the year 2000 (Washington State 1979). Beyond the year 2000, recreation demand should increase not only as a function of population, but also as use on adjoining areas is displaced by other forms of recreation use and other resource activities. This is particularly true for semi-primitive recreation opportunities (Figure III-12).

FIGURE III-12 Projected recreation demand in RVDs from present to the year 2030.



Plans, Policies and Controls of Other Agencies

Recreation plans and policies for much of the Okanogan National Forest are the result of the National Park Act of 1968 which created the North Cascades National Park, two National Recreation Areas (Lake Chelan and Ross Lake), the Pasayten Wilderness and an addition to the Glacier Peak Wilderness. The 1968 legislation recognized the "establishment of a vast, contiguous recreation complex in the State of Washington" and provides a clear legislative mandate for the management of "...National Forests adjacent to the park." Section 504 of the Act required the responsible Forest Service and National Park Service administrators to develop a joint plan for management of the North Cascades recreation complex (U.S. Congress 1968). The current Joint Plan was approved by both agencies in August, 1974.

Coordination of recreation management with several agencies is necessary. This includes the National Park Service, Washington State Department of Natural Resources, Washington State Department of Game, Bureau of Land Management, Colville Confederated Tribes, State Parks and Recreation, Interagency Committee for Outdoor Recreation, and Okanogan County.

The State of Washington encourages land management agencies to consider administering a portion of their lands as "backcountry areas" to help meet recreational demands for non-roaded recreational opportunities outside the Wilderness Preservation System (Washington State 1979).

Opportunities

Several major opportunities are present for enhancing the National Forest's recreation resource.

The wide variety of uses and activities that are possible provides a broader spectrum of outdoor recreation opportunities than now exist. Winter sports activities can expand greatly.

Numerous potential campground sites have been inventoried and are available for development as demand increases. Development of a four-season destination resort at Early Winters will help meet statewide downhill ski demand. Visitor information services can be expanded, particularly along the North Cascades Scenic Highway, Hart's Pass and in the 5-Lakes area.

The role of the private sector in helping to provide quality recreation opportunities can be expanded.

VISUAL RESOURCE

Recreation management and the variety of recreation opportunities provided are complemented by the visual resource. The Okanogan National Forest has large acreages of spectacular scenery. The largest acreages are within the North Cascades Scenic Highway, Pasayten Wilderness, Lake Chelan-Sawtooth Wilderness, Upper Methow River, Tiffany Mountains and along heavily traveled road and trail corridors. The 87,572-acre North Cascades Scenic Highway was designated by Congress because "certain lands along the North Cascades Highway have remarkable scenic values, representing a unique aesthetic travelway through the Cascade Mountains in the northern portion of the State of Washington. The value of preserving this scenic area and assuring that it is managed in such a manner that its scenic beauty and recreation qualities are maintained for future generations is recognized by Congress" (U.S. Laws, Statutes 1984).

Supply Potential

The visual resource on the National Forest has been inventoried using the Visual Management System (Visual Significance and Scenic Viewshed Resource Map). This system uses the physical features of the land (variety class) and peoples' concern for scenic quality (sensitivity level) to develop degrees of acceptable alteration of the natural landscape (visual quality level). Appendix I describes visual resource terms.

Over 90 percent of the National Forest is inventoried in the two highest variety classes of scenic quality, distinctive and common. Because of this, the inventoried visual quality level is high to moderate (retention and partial retention) on approximately 75% of the National Forest (Table III-25).

TABLE III-25 Classification of National Forest by Visual Variety Class and Inventoried Visual Quality Levels

Visual	Visual Variety Class							
Quality Level	Distinctive		Common		Minimal		Total	
	acres	percent	acres	percent	acres	percent	acres	percent
Preservation	626,200	37	---	--	---	--	626,200	37
Retention	218,700	13	77,500	5	1,800	--	298,000	18
Partial Retention	66,500	4	214,400	13	8,100	--	289,000	17
Modification	5,000	--	357,700	20	51,300	3	414,000	23
Max. Modification	500	--	24,000	1	54,500	4	79,000	5
Total	916,900	54	673,600	39	115,700	7	1,706,200	100

Viewsheds

The visual resource on the National Forest has also been inventoried by specific location (viewsheds) (Visual Significance and Scenic Viewshed Resource Map). These viewsheds, along with the existing visual condition of the viewshed, are shown in Table III-26. The visual condition terms are described as follows:

> Natural appearing (NA) - no more than 5 percent of area actually seen appears to be visually altered. The altered area may include up to 1 percent moderately altered but none heavily altered.
>
> Slightly altered (SA) - no more than 10 percent of area actually seen appears to be visually altered. The altered area may include as much as 5 percent moderately altered but no more than 3 percent heavily altered.
>
> Moderately altered (MA) - no more than 20 percent of area actually seen appears to be visually altered. The altered area may include as much as 10 percent moderately or heavily altered but not more than 5 percent heavily altered.
>
> Heavily altered (HA) - more than 20 percent of area actually seen appears to be visually altered. All the altered area may be heavily altered.

TABLE III-26 Non-Wilderness Viewsheds and Existing Visual Condition

	Total Acres	Existing Visual Condition
Sensitivity 1 Viewsheds		
1 North Cascades Scenic Highway	49,500	NA
2 Winthrop/Lost River	15,900	SA
3 Twisp/Pateros	9,200	NA
4 Loup Loup Highway	4,500	SA
5 Highway 97	1,300	NA
6 Republic Highway	10,500	NA
7 Lost River/Slate Peak	19,100	NA
8 Chewuch	32,300	SA
9 8-Mile	14,900	NA
10 Twisp River	21,400	SA
11 Bonaparte/Beaver/ Box Canyon/Myers	10,300	SA
12 Havillah Townsite	6,500	HA
13 Toats/Irongate/ 14-Mile	10,700	SA
14 Alta Lake	1,100	SA
15 North Fork Salmon/ Fish Lake	6,600	SA
16 Buttermilk/Blackpine	6,900	MA
17 North Fork Beaver	1,200	NA

	Total Acres	Existing Visual Condition
Sensitivity 1 Viewsheds		
18 North Fork Gold/Libby	11,300	SA
19 Loup Loup	1,700	MA
20 Foggy Dew	4,400	SA
21 Libby/Blackpine	6,700	SA
Sensitivity 2 Viewsheds		
1 Aeneas Valley	2,900	NA
2 Havillah County Road	3,300	MA
3 Toroda	1,100	NA
4 Dry Creek	4,900	SA
5 Harts Pass/Chancellor	2,700	NA
6 West Fork Salmon/ Chewuch	26,400	MA
7 30-Mile Meadows	23,500	NA
8 Buck Pass	5,000	MA
9 Havillah/Myers	1,800	HA
10 Fox Peak/Cooper	6,400	NA
11 South Fork Gold	8,100	NA
Non-Viewshed Areas (percent in natural-appearing condition)	61%	

Current Uses

Viewing scenery and driving for pleasure makes up approximately 20 percent of the total recreation use on the National Forest. Most of this use occurs along the North Cascades Scenic Highway and in the Pasayten and Lake Chelan-Sawtooth Wildernesses.

Demand

Future demand for the visual resource is difficult to quantify because of the nature of the activities associated with this resource. Demand for the visual resource can be assumed to be closely related to the demand for various recreation opportunities. The demand for various recreation opportunities is shown in Figure III-12 under the Recreation Section of this chapter.

Plans, Policies and Controls of Other Agencies

As described in the Recreation Section of this chapter, plans and policies for much of the National Forest are the result of the National Park Act of 1968 which created the North Cascades National Park, the Lake Chelan and Ross Lake National Recreation Areas, the Pasayten Wilderness and an addition to the Glacier Peak Wilderness, and recognized the "establishment of a vast, contiguous recreation complex in the State of Washington" (U.S. Congress 1968).

The Washington State Wilderness Act of 1984 created the North Cascades Scenic Highway and permits management activities, including resource use and development, if the existing scenic values of the area are maintained (U.S. Laws, Statutes 1984).

Opportunities

Several opportunities for maintaining or enhancing the visual resource are present on the National Forest.

Unmanaged stands of lodgepole pine can be managed to increase visual variety.

Timber harvest can be scheduled over time to better maintain desired visual quality levels.

Timber harvest can be utilized to enhance scenic qualities along travelways.

Some opportunities exist for rehabilitating areas which do not meet desired visual quality levels.

WILD, SCENIC AND RECREATION RIVERS

The Wild and Scenic Rivers Act of 1968 declared "that certain selected rivers of the Nation which, with their immediate environments possess outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in a free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of present and future generations".

Supply Potential

River Inventory (Figure III-13).

The entire mainstem of the Methow River from its source to its mouth with Lake Pateros, and its major tributary the Chewuch River are included in the "Nationwide Inventory of Wild and Scenic Rivers" (USDI 1982).

The Methow, Chewuch and Twisp rivers are considered "Rivers of Statewide Significance." Under this classification, the State is to study these rivers for possible inclusion in the State of Washington Scenic River System (Washington State 1979). To date, no action has been taken by the State of Washington to conduct studies on these rivers. There are no plans to conduct such studies in the near future (Bush 1982).

Lost River, Pasayten River, San Poil River and Wolf Creek are on neither the "Nationwide Inventory of Wild and Scenic Rivers" nor are they classified "Rivers of Statewide Significance." Lost River, Pasayten River and Wolf Creek are contained totally or partially within the Pasayten or Lake Chelan/Sawtooth Wildernesses.

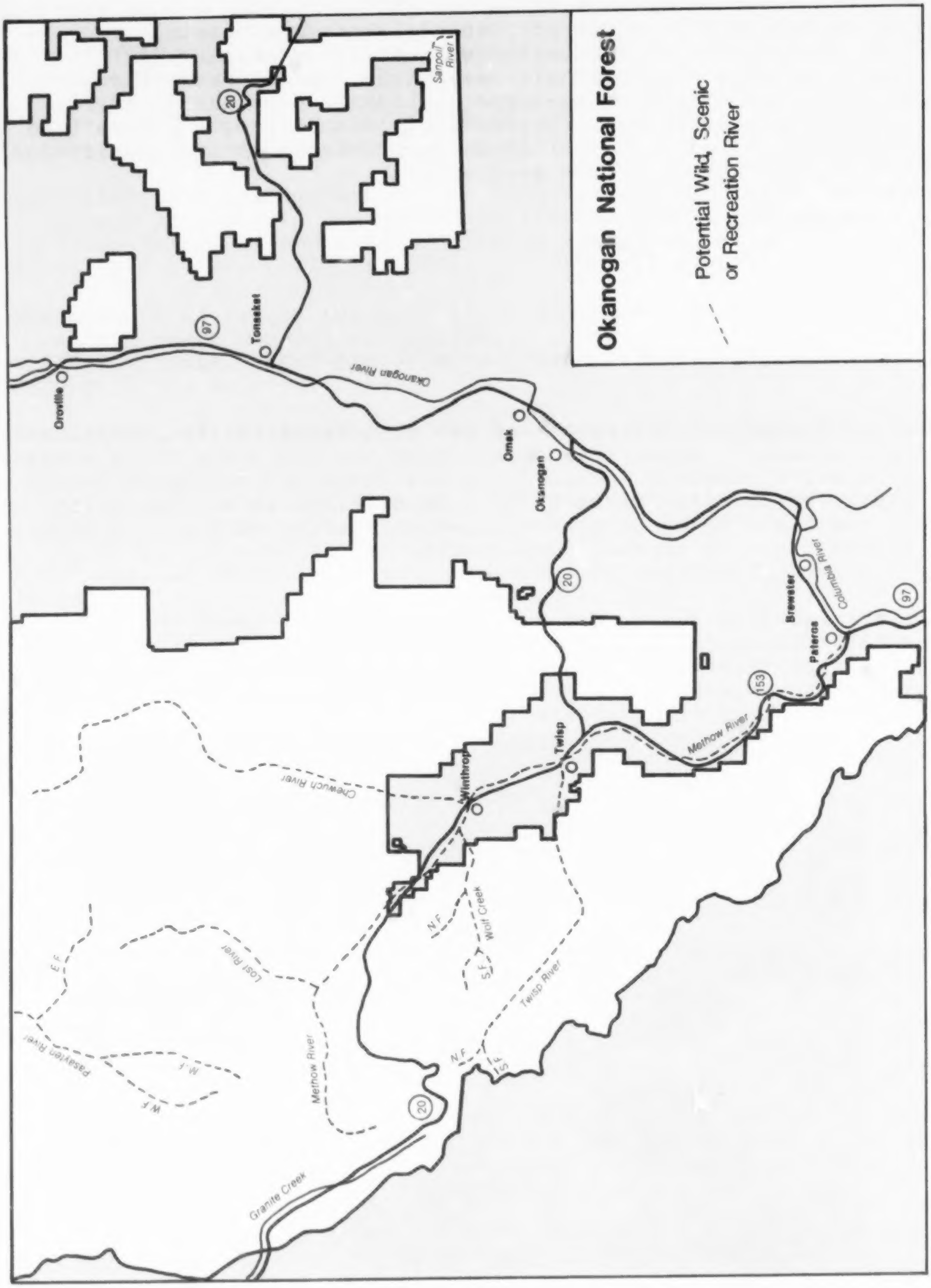
Eligibility

This determines whether a river is free-flowing and whether the adjacent land area possesses at least one outstandingly remarkable value that qualifies the river for inclusion in the National Wild and Scenic River System. Appendix G discusses general eligibility and specific river eligibility determinations.

The Methow River, Chewuch River, Lost River, Twisp River (both North Fork and South Fork), Pasayten River (including the Middle and West Forks) and Wolf Creek (including the North and South Forks) are *eligible* for inclusion in the National Wild and Scenic River System based on exhibiting at least one outstandingly remarkable value and remaining free-flowing throughout the major portion of the primary use season.

The East Fork Pasayten and San Poil Rivers exhibit *no* outstandingly remarkable values required for eligibility.

Figure III-13


Okanogan National Forest
Potential Wild, Scenic or Recreation River
Oroville
Tonasket
Omak
Okanogan
Brewster
Pateros
Twisp
Winthrop
97
20
153
Sanpoil River
Okanogan River
Columbia River
Methow River
Chewuch River
Lost River
E.F.
Pasayten River
M.F.
W.F.
Wolf Creek
N.F.
S.F.
Twisp River
Granite Creek

Potential Classification

This determines which class (wild, scenic, or recreational) best fits an eligible river or river section and is based on existing conditions at the time of inventory. The potential classification of the various eligible river sections on the National Forest is shown in Table III-27. Appendix G discusses general classification criteria and specific river classification determinations.

TABLE III-27 Potential Classification of Inventoried Eligible River Sections

River Section Number	Ownership	Total Segment Length (miles)	Classification (miles)		
			Wild	Scenic	Recreation
Methow 1	NF	13.0	13.0	-	-
Methow 2	NF	2.5	-	-	2.5
Methow 3	Non-NF	64.5	-	-	64.5
Chewuch 1	NF	14.5	14.5	-	-
Chewuch 2	NF	15.5	-	-	15.5
Chewuch 3	Non-NF	11.0	-	-	11.0
Twisp 1	NF	7.0	7.0	-	-
Twisp 2	NF	12.0	-	-	12.0
Twisp 3	Non-NF	13.0	-	-	13.0
Lost 1	NF	17.0	17.0	-	-
Lost 2	NF	2.5	2.5	-	-
Lost 3	NF	.5	-	.5	-
Pasayten	NF	32.0	32.0	-	-
Wolf 1	NF	17.5	17.5	-	-
Wolf 2	NF	2.5	-	-	2.5
Wolf 3	Non-NF	2.0	-	-	2.0
Total		227.0	103.5	.5	123.0

Current Uses

All eligible National Forest river sections receive recreation use ranging from heavy on the lower, more accessible stretches to light on the more remote sections. The primary use on all sections of river is fishing, with camping, hiking and horseback riding popular in the immediate river areas.

Numerous National Forest campgrounds are located near those sections of the Methow, Chewuch and Twisp Rivers which have a potential recreational river classification. There is one summer home near the Chewuch River.

None of the eligible National Forest river sections are actually within livestock grazing allotments although there are both cattle and sheep allotments in close proximity to several of the sections.

Numerous land use encumbrances, especially water transmission structures, exist along that National Forest section of the Twisp River which has a potential recreational river classification. There is a diversion ditch on the lower section of Wolf Creek. The 150-acre Wolf Creek Research Natural Area is located in the Wolf Creek drainage.

There are approximately 3,900 acres of private land within the National Forest boundary along eligible river sections. Of this total, approximately 3,300 acres is along the Twisp River, 500 acres along the Chewuch River, and 100 acres along Lost River and Wolf Creek.

Demand

Nearly all experts on river recreation foresee significant increases in river-related activities in the future. The Pacific Northwest River Basins Commission projects a 42 percent increase in fishing and a 148 percent increase in boating by the year 2000. While only a portion of the total participation in these activities occurs on rivers, there is no reason to believe that the rate of increased use on rivers will not also be as high (Washington State 1979).

The best measure of demand for wild and scenic rivers on the National Forest are the comments received after release of the 1982 Draft Environmental Impact Statement (DEIS) for the Okanogan National Forest Plan.

> Wild and scenic rivers was not raised as an issue during the issue scoping process for the DEIS.
>
> After release of the DEIS, between 110-120 people provided input favoring wild and scenic river designation for the Methow, Twisp, Chewuch, Pasayten and Lost Rivers and Wolf Creek. Approximately 75 percent of those favoring designation were from Western Washington. Another 11 percent favoring designation were from the Methow Valley.
>
> Because wild and scenic rivers were not then an issue to be resolved in the DEIS, opponents to designation provided no input.

Plans, Policies and Controls of Other Agencies

The Wild and Scenic Rivers Act provides two methods for adding a river to the National Wild and Scenic Rivers System.

1. Congress can designate a river directly or it can authorize a river to be studied as a potential wild, scenic or recreational river. Upon completion of a study by the Department of Agriculture, a study report is transmitted to the President, who forwards it with his recommendations to Congress for action.

2. Upon application by the Governor of the state involved, the Secretary of Interior can designate a river as a component of the national system. This can only be done after an act of the State Legislature designates a river within state borders as a wild, scenic or recreational river to be permanently administered as a wild, scenic or recreational river by an agency or political subdivision of state concerned.

   The State of Washington has as an objective to provide opportunities for public use and enjoyment of scenic rivers and their adjacent uplands in as natural a condition as practical (Washington State 1979). The State proposes accomplishing this by:

   > Identifying and encouraging establishment of those rivers, or segments thereof, which can only be protected in their free flowing state by being added to the National Wild and Scenic Rivers System.
   >
   > Identifying those rivers, or segments thereof, which qualify for addition to the State Scenic Rivers System.

Opportunities

The National Forest has the opportunity to recommend that certain sections of eligible rivers which cross National Forest lands be added to the National Wild and Scenic Rivers System.

HISTORICAL AND CULTURAL RESOURCES

The Okanogan National Forest contains a number of sites which can enhance understanding of the heritage of North Central Washington. Most of these sites are from the trapping, mining and early Forest Service administration periods in history.

Supply Potential

Cultural Resource Overviews have been completed for the National Forest (Ubelacker 1978; Bennett 1979). These overviews and project level cultural resource inventories have identified over 400 historical and cultural resource sites. Approximately 80 percent of the inventoried sites are outside the Pasayten and Lake Chelan/Sawtooth Wildernesses (Table III-28). Limited numbers of prehistoric sites have been identified.

Approximately 170 cultural resource sites have been identified on lands of other ownership throughout the Okanogan County. Some of these sites are of prehistoric origin (Ubelacker 1978; Bennett 1979).

Bonaparte Mountain Lookout and the Parson Smith Tree Site are on the National Register of Historic Places.

All Civilian Conservation Corps (CCC) era structures have been inventoried (Throop 1979). All CCC era administrative structures have been evaluated for eligibility for the National Register of Historic Places. Eligible structures are to be included in a Region-wide programmatic nomination.

Except for the CCC era structures, few inventoried sites have been evaluated to determine their eligibility for inclusion on the National Register.

TABLE III-28 Inventory of Cultural Sites on the National Forest

Site Type	Outside Wilderness	Inside Wilderness
Cabin	71	41
Mine	146	5
Forest Service Structures (not CCC)	61	18
CCC Structures	43	0
Prehistoric	9	1
Other	54	22
Total	384	87

Current Uses

All CCC era structures are currently used in campgrounds, administrative sites or work centers, or are under special use permit for recreation purposes.

Remnants of the Parson Smith Tree, formerly located in the Pasayten Wilderness, are preserved in an interpretive display at the Early Winters Visitor Center.

Demand

The extent of prehistoric use of the National Forest is virtually unknown. Discovery of sites will provide key information needed to understand the life and patterns of prehistoric occupation of the area.

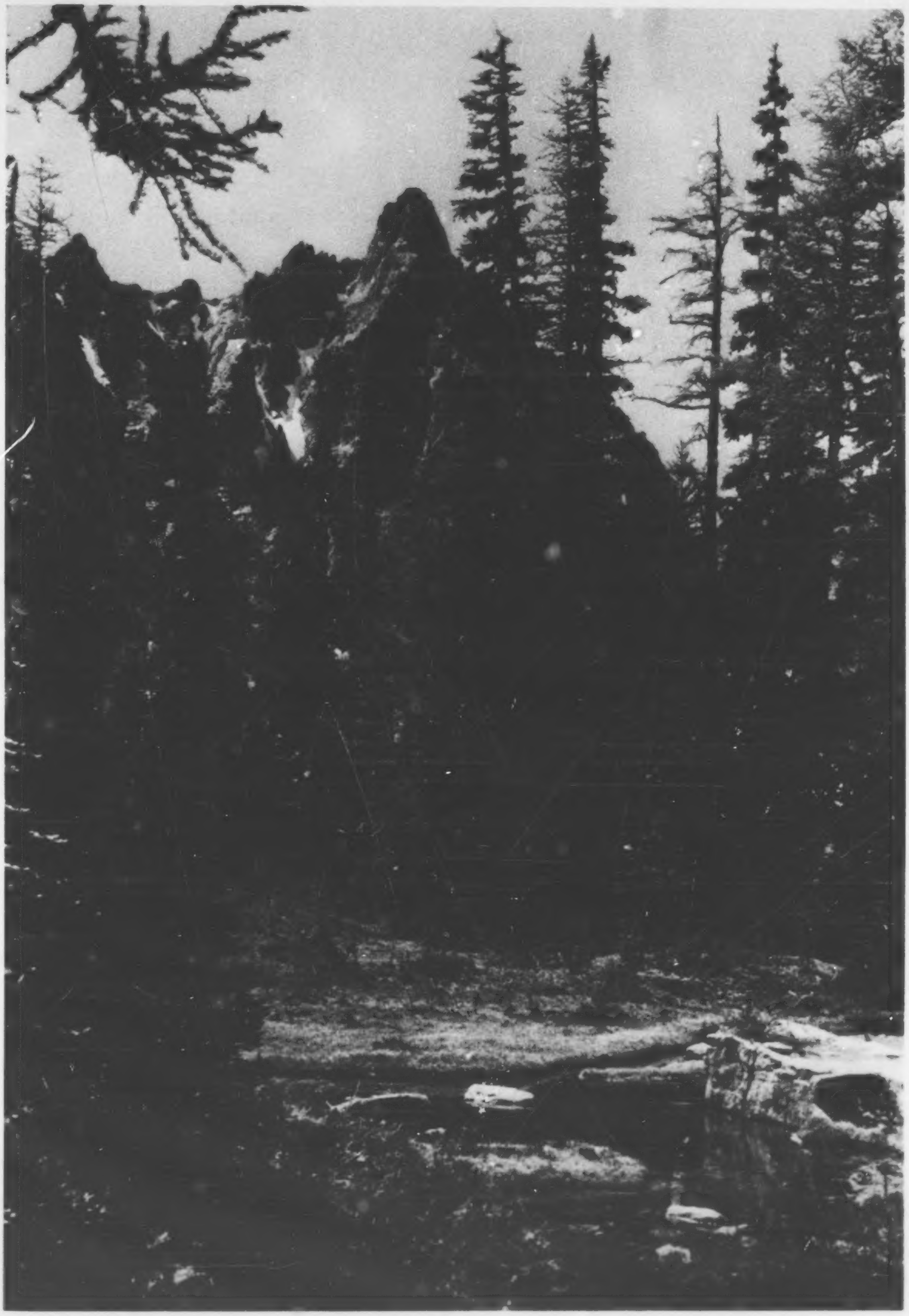
Future demand for historical and cultural resources can be assumed to be dependent on how well these resources are enhanced to bring out their inherent values for the benefit and enjoyment of the public. Enhancement may include such activities as displays, interpreted sites, restored and rehabilitated buildings, and excavations with corresponding reports.

Plans, Policies and Controls of Other Agencies

The State Historic Preservation Office currently reviews project plans to assure compliance with cultural resource requirements. Cultural resource management activities will be coordinated with the State Plan.

The Advisory Council on Historic Preservation is reponsible for administration of Section 106, which deals with the effects of activities on properties listed on or eligible for nomination to the National Register, of the National Historic Preservation Act.

The National Forest works closely with the Colville Confederated Tribes regarding cultural resources of suspected prehistoric origin.



Chapter IV

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter provides the scientific and analytic basis for the comparison of alternatives presented in Chapter II.

This chapter presents the consequences on an alternative-by-alternative basis. This chapter is organized like to Chapter III. The consequences of the alternatives are grouped under physical, biological, economic and social subheadings.

The narrative here discusses the reasons for and causes of environmental effects of the alternatives in terms of access and vegetation changes. The important inter-relationships between resources, land uses and environmental conditions are discussed in terms of these two driving factors. In addition, the discussion here indicates the basis for or source of some estimates, and directs the reader to other places in the document where more information on a topic is available. Extensive quantitative information about effects is available in the tables in Chapter II, particularly in Tables II-3a, II-4, II-5, II-6, II-7 and II-8.

The net public benefits from the Okanogan National Forest are obtained from resources with market and assigned prices, as well as from resources and conditions for which prices cannot be determined.

Nonpriced benefits include both quantifiable and qualitative outputs and effects. Both quantified and qualitative outputs and effects are important for understanding the whole picture of environmental consequences and the net benefits to the public. They are discussed here and in the comparison of alternatives in Chapter II.

The material in this chapter explains the relationships between resource outputs and environmental qualities and consequences. It includes, where relevant, the ties between quantitative and qualitative aspects of the information.

Some of the management activities on the forest would cause environmental damage if they were done without means of mitigating that potential harm. Because many of those adverse environmental effects can be anticipated, one can design and prescribe, in advance, ways to prevent that damage.

These mitigation measures consist of a broad scope of actions that avoid, minimize, rectify, reduce or compensate for environmental impacts.

Those means of mitigating adverse environmental impacts that are common to all alternatives are found in the Standards and Guidelines for management activities (see the proposed Forest Plan). This listing of the "do's" and "don'ts" for management activities would guide Forest Service personnel as they do their job of managing the forest. For example, part of the Standards and Guidelines for managing habitat for mule deer reads:

> Manage disturbing activities during critical periods (e.g. nesting, lambing, fawning and kidding seasons) to protect wildlife.

It is through the use of these requirements for management activities that most of the potential adverse environmental impacts are avoided or made much less adverse. These are the principal means of mitigating potential adverse impacts.

PHYSICAL CONSEQUENCES

This section discusses the consequences on the physical aspects of the environment. These include microclimate, soil, water, minerals, energy, air quality, fire, infrastructure improvements (roads, utility corridors), wilderness and roadless areas.

MICROCLIMATE CHANGES

Structural changes to forest and range vegetation cause changes to microclimates. In turn, microclimate changes can have environmental consequences on wildlife populations, off-site water, timber and range productivity and fire. The specific environmental consequences on the forest's vegetation, range, water, wildlife and fire are discussed in those resource sections of this chapter. The general types of impacts are discussed below.

TEMPERATURE

All vegetation moderates temperature. Shrubs form a nearly continuous upper surface which reflects solar (short-wave) radiation back to the sky in the daytime and reflects long-wave radiation from the soil surface back toward the soil surface at nighttime. This surface acts as the effective ground surface for radiation. The maximum daytime temperatures and minimum nighttime temperatures are near the top of the brush or dense plant cover, although temperatures near the ground are not greatly different.

Tree crowns in a heavy forest also form a nearly continuous cover. The canopy top is the air contact surface. The highest daytime temperatures are found near the crown top, and the temperatures will decrease gradually between this level and the ground. Maximum air temperatures near the crowns may be 18° F. to 20° F. warmer than air temperatures near the ground. Air temperature decreases fairly rapidly with height above the tree crowns.

Less dense vegetation will permit more solar radiation to penetrate to the ground than will a dense cover. The degree of partial ground shading provided by less dense vegetation determines the air temperature distribution between the ground surface and the canopy top.

Air temperatures at 4-1/2 foot height within the forest in the afternoon are likely to be 5° F. to 8° F. cooler than the temperatures in nearby cleared areas.

Night temperatures in dense timber stands tend to be lowest near the top of the crown where the long-wave radiation originates. Some cool air from the crowns sinks to the ground surface. Additional cooling at the ground surface can also occur by radiation to the cooling crowns. Sparse vegetation merely decreases the temperature inversion just above the ground surface.

During clear weather, surfaces exposed to full midday sun may reach temperatures as high as 160° F. or more. This warms the air near the surface and reduces relative humidity. This often results in surface humidity 4 to 8 percent below adjacent shaded areas. At night, cooling of these exposed surfaces may cause dew to form on them, while not forming under the tree canopy. Surface humidity is commonly much greater, and at the same time much more spotty in open forest stands than under forests having closed-crown canopies. Clouds also tend to reduce the diurnal extremes.

Temperature is important at the ground because it affects the ability of vegetation survival for range and timber production, wildlife survival, snow melt rates and fire intensity.

MOISTURE

Vegetation moderates surface temperatures and contributes to air moisture through transpiration and evaporation. Both factors affect local relative humidity. A continuous forest canopy also decreases surface wind speeds and the mixing that takes place with air movement.

The differences in humidity between forest stands and open areas generally vary with the density of the crown canopy, all other factors equal. Under a closed canopy, humidity is normally higher than in open areas during the day, and lower at night. The higher daytime humidities are even more pronounced when there is a green understory.

Soil moisture is influenced by relative humidity and air temperature above the ground. High air temperature and low humidity rapidly evaporates soil moisture from the upper foot of soil. This is critical because young plants' entire root zone is in the upper foot of soil. Severe conditions there can kill most plants no matter how favorable soil moisture is below the dried zone. The survival of vegetation determines how successful forest management practices are.

WIND

Vegetation is part of the friction surface which affects wind blows velocity near the ground. Forests and other vegetated areas are characteristically rough surfaces and contribute to air turbulence. They also are somewhat pervious, allowing some air movement through, as well as over and around, the vegetation. Wind speeds over open, level ground, although zero at the very surface, increase quite rapidly in the first 20 feet above the ground.

The leaf canopy of a forest effectively reduces wind movements because of its large friction area. Forests where the canopy extends to near ground or with understory vegetation, wind speed is nearly constant from the surface to near the crowns. Above the crowns, wind speed increases with altitude gain.

At low wind speeds, the forest has a small effect on the speed of the wind. For example, a 4 mph wind measured in the open might be slowed to 2.5 mph at the same height inside the forest. But a fairly high wind speed in the open will be slowed in much greater proportion. Thus, a 20 mph wind might be reduced to 4 or 5 mph in an 80-foot tall normal stand of second-growth pine. The reduction would vary considerably, however, among different forest types.

Larger scale eddies often form in forest openings. The higher winds aloft cause the slower moving air in these openings to rotate about a vertical axis, or roll over in a horizontal manner. This affects the redistribution of snow in the winter, causing greater snow depth in openings.

Strong surface heating, as on warm, sunny days, adds to the complexity of these forest airflow patterns. Thermal turbulence is added to the generally turbulent flow through open timber stands as it is to the flow above a closed forest canopy. The flow beneath a dense canopy is affected only slightly by thermal turbulence, except where holes let the sun strike bare ground or forest litter on the forest floor. These become hotspots over which there is a general upwelling of warm air through the canopy. This rising air is replaced by gentle inflow from surrounding shaded areas.

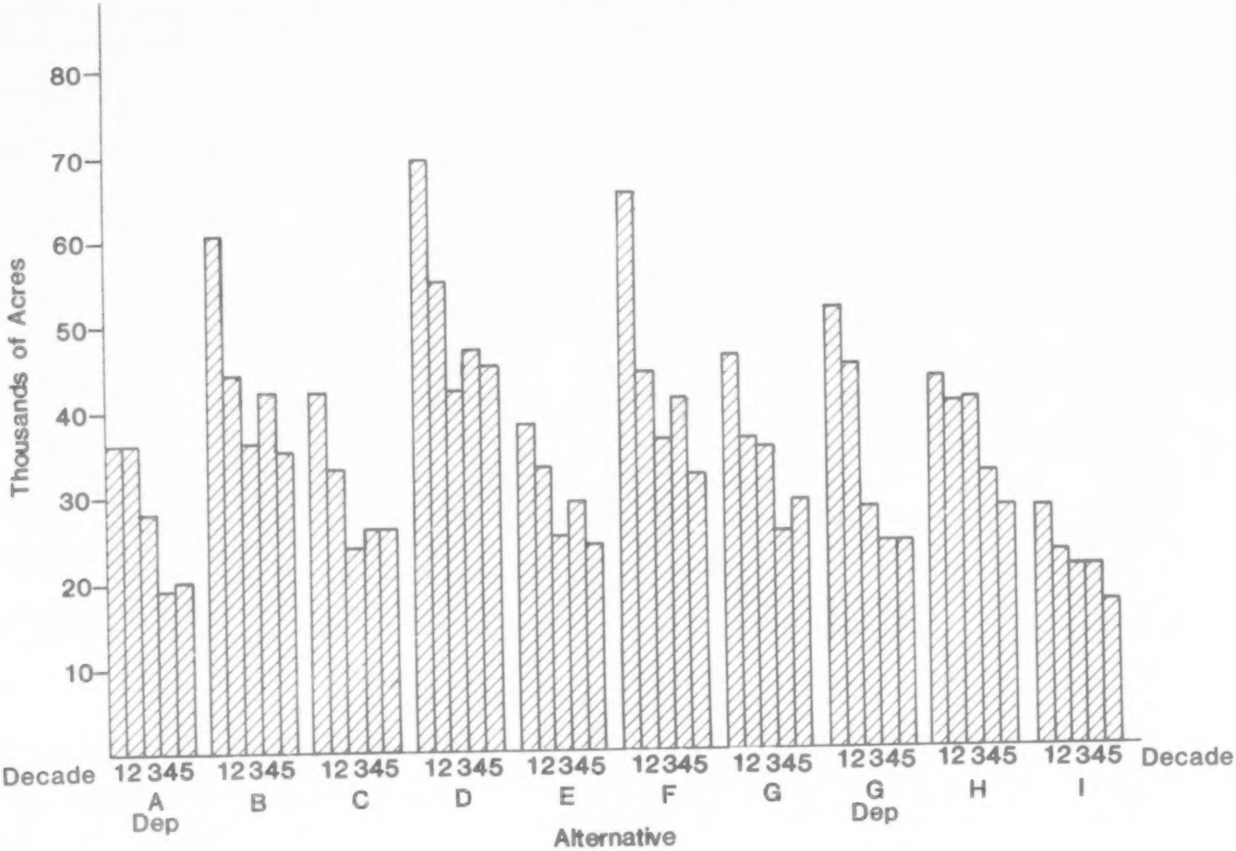
Variations in ground cover absorb heat at different rates. The heat rises from the vegetation and/or bare slopes causing variation in local winds.

Wind is important because it affects the rate of evaporation of soil moisture from soil and the rate of transpiration from vegetation. This is important in determining the success of forest management practices. Wind is important because it affects the temperature profiles on the ground and in canopies. This has a substantial influence on wildlife survival and living conditions. Wind is of vital importance to fire behavior. Many of the forest's resources can be quickly destroyed or damaged if wind is not given consideration in management options.

AREA IMPACTED

The amount of area that would have the microclimate changes discussed are presented below in Figure IV-1.

FIGURE IV-1 Acres of created openings during each of the first five decades by alternative. Includes non-stocked and poorly growing stands regenerated by other than timber sales.



Alternative D would produce the largest number of forested acres in an open condition during the next five decades. Approximately 65 thousand acres of openings would be created by timber harvesting during the next ten years. Alternatives F and B would result in 15 percent fewer acres of created openings resulting from harvest than Alternative D. Alternative I, followed by Alternatives E and C, would result in the least number of forested acres in created openings. The number of forested acres in an open condition in Alternatives E and C would be about 36 percent higher than Alternative I. During the coming decade, Alternative I would clearcut or seed tree harvest about 28 thousand acres. During the same period, Alternatives E and C would harvest 38 thousand and 42 thousand acres respectively by these methods.

When commercial thinning is accomplished, stands would be open with the crowns of individual trees seldom touching. Interception of light and precipitation by tree crowns would be greatly reduced. Removal of excess trees would increase soil moisture available for use by remaining trees and by ground vegetation.

Accelerated timber harvest in Alternatives A and D would affect more acres in the early decades than the other alternatives. Areas impacted decrease over time. The other alternatives would remain more constant over time, though they vary some from decade to decade.

These changes would be short-lived (usually less than 10 years) due to two reasons: (1) the mitigating effects of shelterwood harvest patterns (about 50% of the mixed conifer stands and 10% of the lodgepole working group) and, (2) growth of vegetation to replace that which would be removed.

WATER RESOURCES CONSEQUENCES

WATER QUALITY

Sediment/Turbidity

Turbidity or cloudiness of the water is a direct result of the sediment load of the water. Turbidity is a measure of directed light that passes through water and its suspended and dissolved load. Turbidity can affect light dependent organisms because it reduces light. It may affect fishing success because fish would be unable to see lures or bait when the water is turbid. Turbidity is also used to establish standards of water quality. However, similar turbidity values for water from different basins does not mean the amount of sediment level is similar. Turbidity is dependent on sediment particle size, shape and color. Different conditions of climate, geology, vegetation and soils creates unique relationships between turbidity and suspended sediment.

Management practices which may cause substantial, adverse effects on surface water are road construction, fire suppression, prescribed burning, insect and disease suppression, noxious weed treatment, operation of mineral claims and timber harvest. These activities can cause chemical, physical and biological impacts to surface water quality. They can affect physical parameters such as suspended sediment levels, turbidity and temperature.

The intensity of a management practice influences sediment production. For instance, clearcutting has a greater impact on water quality than precommercial thinning, even though the activities may be in the same location and of the same size. Potential damage to the water resource depends on where surface disturbance occurs. For example, runoff may carry sediment from road construction to a buffer strip where sediment is deposited.

Sedimentation increases are generally short-term. Studies in southern Idaho and Central Washington State suggest 80%-90% of the accelerated sediment production from surface erosion occurs during the first two years following the activity (Megahan 1972).

Roads change the slope hydrology by intercepting ground water and forcing the water to leave the site quickly. The surface water has more energy to carry sediment and cause erosion.

Of lesser importance is sedimentation from timber harvest and slash disposal. Generally sediment from timber harvest is less than that produced by road construction.

Range management activities may produce local sedimentation in a reach of stream, but are minor compared to the overall sediment production of the forest.

Increased overland erosion associated with timber harvest and prescribed burning occurs on some of the ash cap dominated soils. Large scale harvesting and prescribed burning within some of the lodgepole pine dominated drainages may also increase sediment in local streams.

Generally, mining activities have not adversely affected water quality. Past mining activities at Barron and Azurite Peak have left old tailing ponds without any erosion protection. Uncontrolled road water runoff has periodically increased sediment load when water ran through and eroded old tailing ponds at Barron. The potential still exists for further erosion of the tailings ponds. At the Azurite Mine, Mill Creek has the potential to undercut the tailing piles. The tailings have a very low pH (near 3). No known fish kills have occurred from either old mining operation. Total erosion of the tailing ponds or piles could cause limited stream sediment impacts to the smaller streams draining the areas. Impacts should not be noticed in Ross Lake which eventually receives these waters.

Table IV-1 shows the greatest difference in sediment output between the alternatives with the lowest amount of new road construction and reconstruction and those with the largest amount. Alternatives C, E, and I would produce the least amount of increased sediment. The "Five Decade Average" reflects similar difference between the alternatives as the initial decade.

The major impacts would be short-term, lasting 1 to 2 years. The values for each decade represent the worst case for the whole decade, even though the impacts would likely be less because the major impacts do not last for the whole decade. There could be substantial long-term impact on water quality from implementing any of the alternatives without mitigation practices. The consequences of the increased sediment levels would be higher turbidity levels and increased silt, sand, and gravel deposition in stream channels.

Turbidity would not be likely to increase or decrease significantly for any alternative. Turbidity increases would be expected to remain within the turbidity standards prescribed by Washington State. Water quality monitoring on the Okanogan National Forest in 1979-1981 indicated low turbidity values even though occasionally the suspended sediment levels were substantial.

Increased silt, sand and gravel deposition effects would be limited to the local areas of management operations although the accelerated sediment would move downstream over several years. This could affect fish spawning habitat near the operation. The fish and wildlife section discusses the impacts of additional sediment deposition on habitat.

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TABLE IV-1 Sediment Production Comparisons by Alternative

	Estimated Sediment Production Accelerated Plus Natural (thousand tons per decade)	
Alternatives	First Decade	Five Decade Average
A	321	338
B	331	349
C	313	323
D	337	366
E	307	324
F	342	350
G	323	336
G	326	337
H	334	345
I	306	312

Mitigation Measures

Guidelines for filter strips, waterbars, flow estimates for culvert size, risk assessment, erosion control by grass seeding, fertilization and some suggested "C" clauses for timber sale contracts are listed in Appendix E. These are not the only techniques available. Other approaches may be used as long as the soil and water resources are adequately protected.

Effectiveness of Mitigation Measures

Appendix E contains mitigation measures relating to water. Past experience on the Okanogan National Forest has shown these measures to be generally effective in eliminating adverse impacts on a specific piece of land. In general, the steeper the landscape, the more sophisticated the mitigation measure must be. These measures must be designed for specific locations. The effectiveness will vary and can be determined for each project at the time of design.

Temperature

Water temperature is influenced by the amount of incoming solar radiation. Incoming radiation to surface water can be increased dramatically by removing the shade along the steam channel.

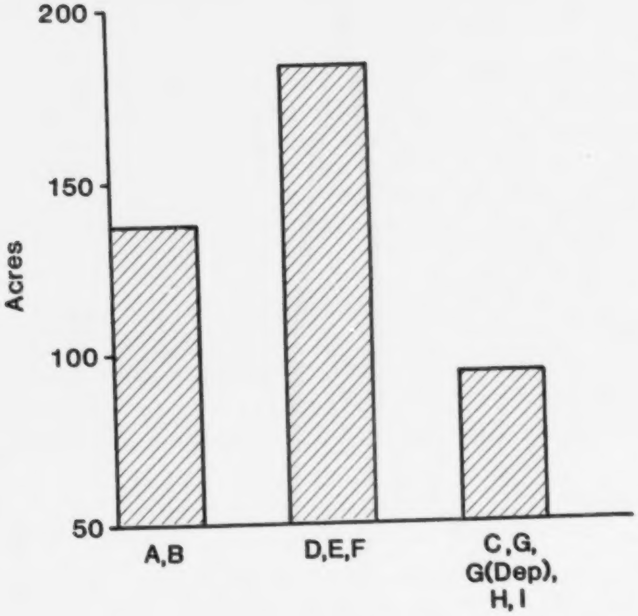
Water temperature is not a current issue on the Forest. However, some biologists feel higher water temperatures would benefit fish habitat, because temperatures are too low for good food chain development. Fish do not have the food available to grow rapidly and increase or maintain populations under moderate fishing pressure.

Water temperature increases could also be beneficial to irrigators. Warmer irrigation water could contribute to more rapid growth for field crops.

Higher water temperatures could reduce the domestic water quality. Warmer water may not taste as good as cooler water. Warmer water also allows the growth of organisms that may be harmful to humans or obstructs water delivery systems.

The amount of area cut in the riparian areas suggests which alternatives would cause the greatest temperature increase when compared to the current situation, because riparian areas border much of the surface water. Figure IV-2 shows harvested areas over the first five periods of each alternative.

FIGURE IV-2 Acres of Created Openings in Riparian Areas Per Year



Alternatives D, E and F have about 6% more created openings than existing conditions. Water temperature may slightly increase but should stay at nearly the current levels. All the other alternatives would harvest less timber in the riparian zone than the current direction alternative. Water temperatures should not change if any of these alternatives are implemented.

Fecal Coliforms

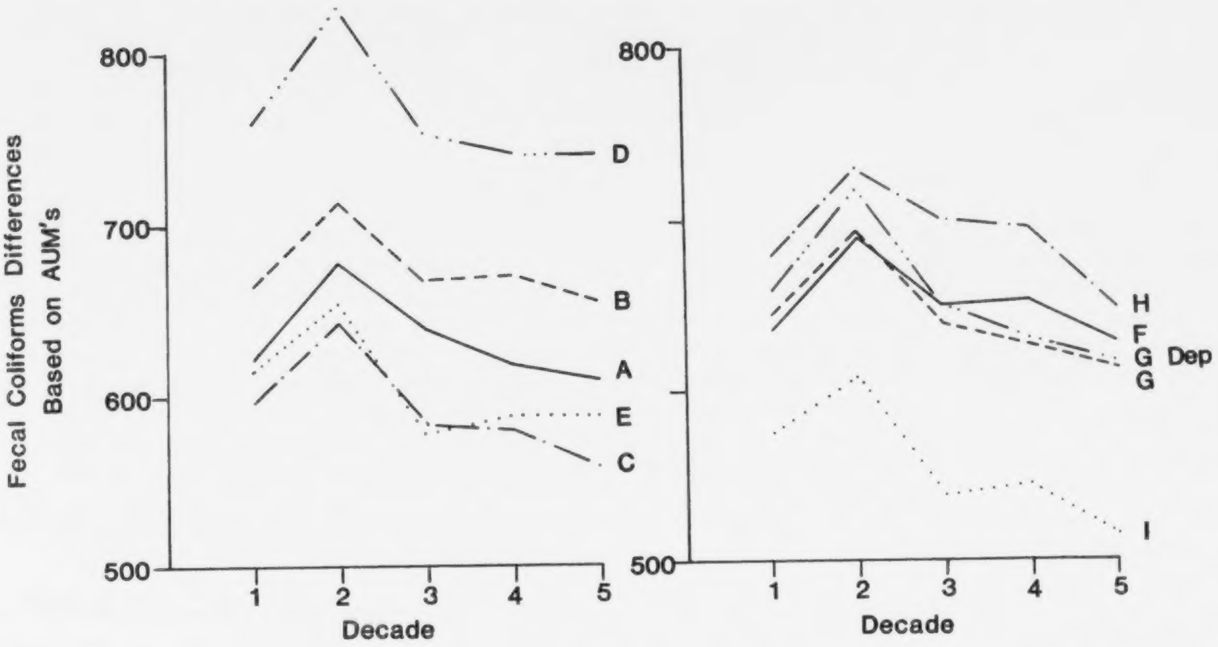
Range practices may affect water quality by increasing stream sedimentation. Fecal coliform levels in surface water may also increase. However, water monitoring of selected areas of grazing have not shown a significant problem (Bennett 1982). Past water monitoring projects on the Okanogan National Forest suggest fecal coliform levels raise to levels near the Washington State Standards but quickly fall to background levels within one to two miles below the stock concentration. The stream environment is harsh for the coliform organisms because temperatures are so cool. Other harmful organisms may or may not survive further downstream.

Recreation activities such as swimming and rafting may cause slight increases in fecal coliform bacteria in extremely high use areas. Studies of water quality in the Greenwater River watershed (Christensen, Pacha, Varness and Lapen 1979) suggested potential health hazards existed in a high recreation use area. The deterioration of water quality that was detected occurred intermittently and in localized areas. That area receives high use because it is located only 60 miles southeast of Seattle, Washington.

Sampling of water quality at Meadow Creek Campground on the Winthrop Ranger District (1984) showed a slight increase in fecal coliform levels, although water quality was still within state water quality standards. The campground does not receive heavy recreational use except for holiday weekends. Water quality does not appear to be a problem currently, but sustained high use of recreational areas could cause higher fecal coliform levels.

Figure IV-3 Differences in Fecal Coliforms by Alternative Based on Animal Unit Months, shows the relative level of expected stock pressure during each decade. Alternatives with higher levels of stock pressure would have higher levels of fecal coliform.

FIGURE IV-3 Differences in Fecal Coliforms by Alternative Based on Animal Unit Months (AUM's)



Alternatives B, D, F, G, G (departure) and H would have greater potential for increases in fecal coliform than the current situation. The percentage increase varies from 2% to 22%. Higher fecal coliform levels may impair domestic water uses. Chlorinators or their equivalent may have to be installed to destroy the organisms before use. This treatment method should be 100% effective to remove harmful organisms.

Mitigation Measures

If range management impacts on the water resource are substantial, the following mitigation measures would be considered as part or all of the solution of the problem. Ungulate damage can be reduced over time by keeping animals out of the stream. This can be done by: 1) using fences along damaged sections of the creek; 2) falling of trees or placing of barriers along the stream to limit access, thus protecting it; 3) use range riders to keep animals away from the creek; and 4) placing water tanks and/or salt licks to distribute animals and keep stock away from the creek.

Effectiveness of Mitigation Measures

Range protection measures for water quality can be 100% effective if fully implemented. Past experience on the Okanogan National Forest has shown, however, that these are not fully implementable. It costs too much to watch animals closely and to manage resources to keep stock away from streams. The best that could be expected is to keep stock away from the most important reaches of stream. Chance of failure is 50% (Don Pridmore, Range Management, Okanogan National Forest, personal comunication 1985). The percent failure varies because some allotments have more dispersed water sources than others, and it is easier to work the stock away from the streams and rivers. The significance of not keeping stock out of the creeks is usually limited to the immediate vicinity.

GROUND WATER

Ground water exists in many areas of the forest. It is controlled by bedrock conditions, such as fracturing, and weathering; soil mantle characteristics, such as thickness to bedrock and texture; and land form configuration, such as slope gradient, slope shape, and position on the landscape. Road or skid trail construction may intercept ground water and bring it to the surface where it drains from the site more quickly. Some or all of that water eventually returns to ground water flows. Ground water is not normally influenced by common timber harvest practices (does not include road or skid trail construction).

None of the alternatives would be expected to substantially influence ground water levels.

WATER QUANTITY

Potential water yield increases through vegetative manipulation would be insignificant. While soil moisture increases usually occur following vegetation removal, it is largely consumed by remaining or surrounding vegetation. Felix (1984) concluded in the study of timber harvest and water yield increases on the Umatilla National Forest in northern Oregon: "Considering the small percentage of any basin likely to be harvested during a given time frame, the temporary nature of the increases, the small magnitude of the increases, and the yearly variability in annual flow, the effects of any of the harvest methods used in drainages with similar conditions are expected to be so slight that they would be undetectable in large drainages."

The types of water yield changes that could occur are changes in peak stream flow, in annual stream flow or low stream flow. Peak flow in small drainages may increase or decrease depends on where the vegetation manipulation occurs, surrounding vegetation and site conditions, such as soil depth and texture, aspect and elevation. Timing of peak flow could be advanced or delayed a few days at most, depending on various site factors. Annual flows can increase, decrease or stay the same. Percentage of change is insignificant in large drainages. Low flows tend to show the greatest percent of change. Felix (1984) reported some summer low flows in research watersheds increase four times over undisturbed conditions. In most cases, water flow changes last only a few years.

Efforts to increase runoff through vegetative manipulation usually involve clearcutting in different patterns and shapes. The increased openings from clearcutting could increase stream temperature, depending on the location and extent of openings.

Compared to the Alternative A, Alternatives D, E and F could raise the water temperatrue slightly. Alternative B would keep water temperatures at their current levels. Alternatives C, G, G(dep), H and I could cause slightly lower water temperatures because less riparian and wetland areas are harvested each year. Past increases of water temperature have not been significant. Water temperature was not a major public issue or management concern.

None of the proposed alternatives would create significant increases or decreases in annual flow from rivers leaving the Okanogan National Forest.

None of the proposed alternatives would be expected to change the timing of runoff from the large rivers of the forest.

In larger watersheds, the interactions of different aspects, elevations and slope gradients tends to "average" different rates of snowmelt so no change in runoff timing should be expected.

CUMULATIVE IMPACTS

Cumulative impacts are the total impacts on related resources over time. Accelerated sediment production can have short and long-term impacts on several resources. It can affect water quality, water uses, timber production, developed recreation, fisheries, range forage production and visuals. The development of some of these resources can also affect sediment production which affects other resources.

Table IV-2 lists the sediment production by decade for the first five periods.

TABLE IV-2 Comparison of Sediment Yield by Alternative Over Time, Forestwide

	Sedimentation (thousand tons/year)					
Alternative	1st	2nd	3rd	4th	5th	Decades
A (Current Direction)	321	332	335	346	357	
B (RPA)	331	341	345	353	374	
C	313	320	322	328	333	
D	337	344	358	387	405	
E	307	310	322	337	342	
F	342	350	338	352	367	
G	323	329	332	341	354	
G - Departure	326	328	334	344	351	
H	334	342	343	351	357	
I	306	309	313	314	318	

The cumulative impact on water quality is not expected to be substantial from any alternative. There were no substantial short or long-term problems identified during the gathering of public issues. The public issue which dealt with water quality was to maintain at the current level.

Table IV-3 compares the estimated sediment yield in the Methow River at Pateros. This includes all lands. These data are based on the assumption that sediment yield would remain constant from other than National Forest System lands for each alternative for all decades. The potentially largest sediment impact on private lands would be from the proposed Early Winters development. It is proposed at a constant level in each alternative. There would be little difference between alternatives considering the whole drainage system.

TABLE IV-3 Comparison of Sediment Yield by Alternative Over Time, Methow River Basin to Pateros (Includes All Other Lands)

Alternative	Sedimentation (thousand tons/year)				
	1st	2nd	3rd	4th	5th Decades
A (Current Direction)	1320	1331	1334	1345	1356
B (RPA)	1330	1340	1344	1352	1373
C	1312	1319	1321	1327	1332
D	1336	1343	1357	1386	1404
E	1306	1309	1321	1336	1341
F	1341	1349	1337	1351	1366
G	1322	1328	1331	1340	1353
G - Departure	1325	1327	1333	1343	1350
H	1333	1341	1342	1350	1356
I	1305	1308	1312	1313	1317

The Methow River is the major drainage where National Forest lands can have a substantial influence on cummulative impacts. The other major drainage where management of National Forest lands occurs is the Okanogan River. National forest lands in the Okanogan River basin are far removed and a minor part of the Okanogan River watershed. Lands in the Okanogan basin are also less hazardous than those in the Methow River. The impact on the Okanogan River at Tonasket or Okanogan from normal management practices would be insignificant.

SOIL CONSEQUENCES

SOIL PRODUCTIVITY

Soil productivity would be influenced by any of the alternatives. Specific management practices would alter certain soil productivity characteristics that affect vegetative growth. Soil water holding capacity and water availability are the most limiting factors for vegetative growth on the Okanogan National Forest. Soil nutrient status is important, but not limiting until water demands are met.

Moderate soil compaction has occurred after intensive tractor operations on soils high in volcanic ash or silt and clay particles. In most cases the compaction occurred only when soil moisture levels were high.

Glacial-lucustrine soils have the highest clay content of soils on the forest. These have a high potential for soil compaction under normal tractor logging practices.

Compaction may also occur in developed recreation sites from heavy foot and horse traffic. This reduces the vegetative growth and reduces water infiltration into the soil. Water from intense summer rain storms may be funneled back into camping areas, depending on the ground configuration.

Activities that increase the rate of soil erosion are road and skid trail construction, tree yarding, mining, recreation use and fire. The harvest systems when properly used do not significantly increase erosion. There are differences between types of yarding equipment as shown in Table IV-4. Logging residue such as limbs, twigs and needles, plus existing forest litter and vegetation provide ground cover which controls erosion.

TABLE IV-4 Comparative Soil Disturbance by Log Yarding System (Dryness, 1965)

Log Yarding System	Percentage of Logged Watershed with Bare Soil	Percentage of Logged Watershed with Compacted Soil
Balloon	6.0	1.7
Skyline	12.1	3.4
High lead	14.8	9.1
Tractor	35.1	26.4

Helicopter yarding causes the least amount of soil disturbance, especially on steep slopes (45 to 90 percent) and is applicable on areas with shallow or fragile soils. Helicopters, however, require large landings which can contribute measurably to soil erosion if not properly constructed and maintained. Further, road density is at a minimum, which reduces erosion potential.

Tractor yarding with either wheel skidders or tracks can disturb soil over relatively large areas (Table IV-4). Tractors cause deep soil disturbance in the form of compaction, displacement or puddling under saturated conditions. Reduced infiltration capacity due to tractor logging accelerates surface erosion. Tractor yarding requires a network of skid roads over the entire cutting unit. Soil disturbance and surface erosion can be severe when tractors are used on steep terrain. Because tractors operate most efficiently with short skidding distances, access road mileage is high. If logging is well planned (i.e. designating skid roads), soil damage during tractor logging can be markedly reduced over that of an unplanned logging operation.

Tractor skidding in some areas is sometimes difficult to conduct within acceptable damage limits. Displaced soils, streams, steep slopes and unfavorable weather are some of the conditions that can produce damage unless potential problems are anticipated. Careless operation may cause unacceptable damage to soil, water, fishery and timber values.

Cable logging systems move logs to the landing by dragging or suspending logs with cables. Cable systems generally cause less soil disturbance than tractor logging and can operate where tractors would be unsuitable. Depending on the system, yarding up to 5,000 feet is possible, which reduces road density compared to tractor yarding.

The helicopter is a mobile yarder. Yarding distances near 10,000 feet are possible with optimal distances of 2,500 to 4,000 feet. The logs are flown completely free of the ground to the landing. Water and soil disturbance is minimal. Safety and manuverability require large landings of up to one acre.

Log gouging is usually associated with cable yarding systems. Under dry conditions, there is a rearrangement of the surface soil layers by scraping or plowing action. That can cause a nutrient loss or concentration of run-off, subsequent erosion and therefore reduction in productivity. Under wet soil conditions it causes localized soil puddling. Some log gouging of the litter and portions of the top soil can be beneficial to tree seedling establishment.

Soil disturbance is influenced by road construction. The disturbance is determined by road width, road gradient and slope gradient. The soil disturbance increases surface erosion.

Induced non-wettability, the water repellency of a soil from concentrated heat and a coating of organic materials on the surface of the soil particles, can be caused by excessively hot fires on certain soils covered with litter and vegetation. Non wettability changes the hydrologic continuity of the soil, reducing water infiltration and eventual movement of soil nutrients into vegetation. Surface erosion rates may also increase.

There may be some minor soil nutrient losses through soil erosion, burning activities (planned and unplanned) and slash disposal practices. If the soil's nutrient reserve is in the upper 4-6 inches of the soil profile, management activities can reduce the reserve by: (1) displacing the soil; (2) volatilizing nutrients during high intensity burns, or slash disposal practices that do not leave enough organic matter on site to maintain the current nutrient recycling. Total slash disposal would reduce or eliminate organic matter from the soil. This reduces the nutrient source of organic matter which is important in forming and maintaining soil structure. Structure is important because it affects the soil water holding capacity and nutrients for vegetative use. Slash also burning releases nutrients for vegetation use, which is considered beneficial. However, under conditions of coarse textured soils and high precipitation, nutrients may be leached from the site. Water quality may be changed because more nutrients will occur in water runoff and shallow ground water. Runoff from the Okanogan National Forest has so few dissolved nutrients naturally that a substantial increase in dissolved nutrients is not likely to cause significant water quality problems. It may be a benefit to fisheries because it could help improve the food chain. Slash disposal fires which burn too hot can drive the nitrogen from the soil into the atmosphere (volatilization), which is not beneficial. These hot fires can also destroy soil structure and form water resistant soil particles resulting in non-wettable soils.

The direct effects of changing soil depth, soil bulk density and nutrient status are associated with tractor yarding and tractor piling of slash and burning of slash. Table IV-5 lists the expected logging system area by alternative. Tractor yarding has the most effect on soil compaction. Studies in Orgon and Washington indicate about five times greater soil area disturbance from tractor skidding of logs as compared to cable yarding. The difference is about ten times between helicopter yarding and tractor yarding (Dryness, 1965).

TABLE IV-5 Area Subject to Soil Compaction due to Logging (1000 Acres) by Alternative by Decade

Period	1		2		3		4		5		Average %	
Logging System*	T	O	T	O	T	O	T	O	T	O	T	O
Alt A	49	17	115	17	117	24	68	22	29	49	78	22
Alt B	60	17	83	31	59	34	71	35	48	50	66	34
Alt C	52	0	90	2	78	6	68	11	57	20	90	10
Alt D	93	5	137	15	78	42	52	72	53	73	66	34
Alt E	43	8	89	11	62	24	38	49	47	41	67	33
Alt F	41	45	86	40	87	12	75	33	47	52	65	35
Alt G	58	3	89	10	93	9	71	23	42	39	81	19
Alt G (Dep)	70	17	120	10	88	15	49	27	39	31	81	19
Alt H	62	2	94	5	107	5	100	14	53	35	86	14
Alt I	38	1	74	2	67	7	64	7	50	10	92	8

*Logging System: T=Tractor; O=Other

Table IV-5 shows the greatest potential for reducing soil productivity exists in Alternatives A, B, D, G (departure) and H. Alternative D would have the highest acreage for tractor activities. During the second decade all alternatives would have a significant opportunity to change the soil factors which influence productivity. Over the first five decades, Alternatives D, H, G and G (departure) would have the highest potential for reducing total soil productivity. Mitigation measures may be required to fully protect the soil productivity.

During the first decade, Alternatives A, B, D, G, G (departure) and H have the greatest potential for reducing soil productivity through reduction of soil nutrient levels because they have the most tractor yarding and opportunity for complete slash disposal. Mitigation measures are required in these alternatives to prevent widespread reduction of inherent soil productivity.

Mitigation Measures

Specific measures can minimize or reduce soil impacts. These should maintain soil productivity levels at the current position.

Mitigating features include: using other yarding systems that potentially reduce soil productivity the least. Slash disposal is generally not as complete on the steeper slopes. Broadcast burns on steep slopes are normally done when fuel moisture is higher to reduce the potential for a fire that could spread to other areas or damage residual vegetation. Cable yarding of slash is not as complete on steeper slopes as tractor slash piling on more gentle slopes.

Logging on soils where compaction hazards exist is practicable. However, consideration for soil moisture levels is important to minimize compaction.

Compaction or puddling on the Okanogan National Forest can be adequately mitigated through ripping or discing (pulling a deep plow through the soil to break up compactec soil layers). These can result in better water infiltration and increase the potential for tree establishment and/or growth, except in soils with high clay content (glacial-lucustrine origin), or where soil moisture is too high to keep soil clods small.

Compaction can also be avoided with timing of equipment on soils. No compaction was apparent when soil moisture was within standards prescribed by Boyer in "Guidelines for Soil Resource Protection and Restoration for Timber Harvest and Post Harvest Activities," (1979). The compacted or puddled soil can normally be ripped with satisfactory results. Soil moisture levels should be below 30%-35% (in volcanic ash soils only). Coarse textured tills should not have compaction to mitigate.

Alternatives B, D and F include scheduled timber harvest in moist areas, including suitable (for harvest) spruce bogs. Minimizing or eliminating equipment traffic will provide the best protection of the soils. Equipment with lower ground pressure can also reduce compaction. Experience on the Okanogan National Forest indicate these practices would mitigate 95% of the compaction problems (personal communication with Don Boyer, 1985). Potential problems would be if tractor operators did not follow instructions to complete yarding and slash disposal projects.

The impacts of slash burning can be minimized by controlling fire intensity. The lower the fire intensity, the lower the nutrient loss from the soil would be. Fuel moisture and fire weather should be favorable to control of fire intensity.

Broadcast burning is preferable to burning piles. Broadcast burning has lower average burn intensity, but can affect a much larger area. Reduced on-site machine activity also reduces impacts on soil characteristics which affect soil productivity.

Whole tree yarding should be considered only where sufficient organic matter would remain on-site to insure adequate nutrient reserves. Appropriate organic residue levels would be determined as specified in the forest-wide Standards and Guides. Soils covered with excessive organic matter and debris may need lower slash levels after treatment to allow regeneration.

If relatively hot, intense burns do occur, measures to eliminate or reduce soil and site impacts should be taken.

1. Fertilizer can be used to replace nutrients lost through volatilization and/or leaching. However, fertilization does not solve problems associated with loss of organic matter and modification of the soil microbial community.

2. Nitrogen fixing plants can be planted to help replace soil nitrogen losses from burning. This is not as effective for rapid buildup of nitrogen levels as fertilization.

3. Innoculation of nursery stock with appropriate mycorrhizal fungi may be helpful for seedling establishment in hot burn areas.

Controlling fire intensity offers the highest chance of success of maintaining soil productivity. This approach should be successful nearly 100% of the time. The only potential problem is misjudging fuel moisture and/or fire weather. This is not a likely occurrence. The basis for these mitigation practices is from Adams (1985).

To decrease erosion potential after logging operations are complete, skid trails should usually be revegetated and water barred and many of the low standard logging roads obliterated.

Surface soil erosion can also be reduced if revegetation is successfully initiated within one year after the disturbance.

GEOLOGIC HAZARDS

The landforms and soils of the Okanogan National Forest are the direct result of alpine and continental glaciation. The western half of the forest is characterized by oversteepened slopes carved by alpine glaciers. Glacial tills of granitic origin cover much of the landscape. These till soils have subsequently been influenced by volcanic ash and pumice. Some areas were scoured by the glaciers leaving only exposed bedrock. Glaciation has created some outstanding visual features such as Libery Bell Mountain seen along the North Cross State Highway. Other jagged rock peaks are also present along with mountainous cirques which often contain alpine lakes.

The geologic hazards on these landforms are debris avalanches on the oversteepened slopes and rilling of exposed volcanic ash and exposed glacial till. Some rotational mass failures occur on north and east facing slopes where deep soils occur. High soil infiltration rates minimize the occurrence of severe mass erosion. The most significant hazard is debris avalanches where shallow soils are located on oversteepened slopes. Impacts move off-site quickly and may cause significant damage a great distance away.

The east portion of the forest is characterized by rolling terrain with less local relief than on the west half of the forest. These landscapes were formed by the thick continental ice sheets which covered the entire landscape. The hills and mountains are separated by broad valleys. Glacial tills, glacial-fluvial and lacustrine deposits cover the landscape. The surface soils have since been influenced by volcanic ash. Some soils adjacent to streams or located on slopes where subsurface water comes to the surface are saturated part or all of the year and have high levels of organic matter.

The geologic hazards on these landforms are small, rotational mass failures. Impacts from these hazards are local and rarely move far from the point of origin. The impacts are usually insignificant, but may be significant if a road or structure is destroyed or damaged. Surface erosion is important locally, but not of area wide significance because sediment does not move quickly off-site.

Timber harvest does increase slightly the potential for mass erosion on oversteepened slopes because additional moisture occurs in the soil following timber removal. Alternatives which have the largest amount of road construction on moderate and steep slopes and the largest acreage of timber harvest on steep slopes would have the greatest influence on changing the geologic hazards. Table IV-6, Potential for Increasing Geologic Hazards by Alternative by Decade indicates potential slope disturbance in each alternative.

TABLE IV-6 Potential for Increasing Geologic Hazards by Alternative

Decade	1		2		3		4		5	
Slope Class*	M	S	M	S	M	S	M	S	M	S
Alt A	73	0	0	0	6	2	78	10	72	12
Alt B	40	15	25	6	180	9	30	8	195	64
Alt C	4	0	3	2	23	1	13	2	98	4
Alt D	13	1	38	0	150	14	118	64	178	37
Alt E	15	1	7	0	52	8	45	8	17	13
Alt F	81	17	0	0	77	0	40	9	166	56
Alt G	10	0	12	4	29	4	41	6	110	46
Alt G (Dep)	13	0	12	2	56	2	48	6	112	39
Alt H	8	1	10	2	20	0	25	3	131	45
Alt I	4	0	1	1	13	1	0	0	12	4

1/ M equals slopes from 35% to 60%; S equals slopes steeper than 60%

Alternatives B and F have the greatest potential for increasing geologic hazards because harvest and road construction are highest on the steep slopes. In the first two decades, Alternatives D, F, G, G (departure) and H have the highest potential for increasing mass failure hazards. This potential does not appear to be significant overall, as accelerated mass erosion from previous clearcuts and road construction on steep slopes has not occurred except for isolated instances of saturated soils and road cutbank failures.

The problems are more major on the western portion of the forest. The impacts would move quickly off-site, leading to loss of site productivity.

Mitigation Measures

Highly effective mitigation measures are those which are designed for specific locations considering the soils, bedrock condition, aspect, slope water handling characteristics and slope gradient. These can be determined by the Forest Engineer on a case-by-case basis. The designed mitigation measures would be highly successful. The major problem that could occur is that climatic events could occur that were not planned in the design.

Mitigation to reduce saturated soils is to use small clearcut units of less than 10 acres and use partial cuts where possible. The remaining and/or surrounding vegetation would consume some of the excess water.

MINERALS AND ENERGY REQUIREMENTS

MINERALS

The Forest Service has few opportunities for directly influencing minerals development because of its limited minerals management authority. However, minerals exploration and development may be indirectly encouraged by allocating forest lands to less restrictive management prescriptions.

This has two major positive effects: (1) it generally results in a minimum of surface protection requirements and administrative approval time; and (2) it improves physical access to forest lands primarily because of roads constructed for timber harvest.

Conversely, more restrictive land allocations tend to discourage minerals activities by placing high emphasis on the protection of visual values, unroaded recreation opportunities, or special and unique wildlife habitats. Negative effects may include more restrictive surface protection measures (e.g. special use periods, access or rehabilitation requirements) with accompanying increase of administrative approval time; possible elevation of the environmental analysis to a time consuming EIS; and limited physical access because of lack of timber harvest or other resource developments.

The effects of management prescriptions on minerals access 1/ for each alternative are presented quantitatively in Table IV-7. Between 30,000 and 50,000 acres of old growth (high restriction) and 26,500 acres of riparian habitat (moderate restriction) were not considered in the table because of the small and widely scattered locations of these sites.

1/ "Access" is here defined as the relative ease by which a prospector or miner obtains physical access to an area and completes possible surface disturbing activities. It is dependent largely upon the restrictiveness of the management prescription assigned to the land in question.

TABLE IV-7 Affects of Management Prescriptions on Minerals Access by Alternative

		Mineral Potential in Acres (x1000) 1/					
Alt.	Access 2/ Restrictions	High	Medium-High	Medium-Low	Low/ Unknown	TOTAL ACRES (% of Forest)	
A	Withdrawn3/	27.0	51.6	112.2	452.0	642.8	(38%)
	High 4/	33.5	45.0	60.2	56.6	195.3	(11%)
	Moderate 5/	46.3	99.5	45.2	314.8	505.8	(30%)
	Low 6/	41.3	50.1	75.4	195.3	362.1	(21%)
B	Withdrawn	27.0	51.3	112.2	450.0	640.5	(38%)
	High	38.2	54.5	75.7	66.6	235.0	(14%)
	Moderate	18.4	75.9	19.1	89.5	202.9	(12%)
	Low	64.5	64.2	86.0	410.6	625.3	(36%)
C	Withdrawn	40.1	62.1	154.3	462.8	719.3	(42%)
	High	45.0	72.7	53.6	123.5	294.8	(17%)
	Moderate	42.3	95.2	33.9	326.6	498.0	(30%)
	Low	20.7	16.2	51.2	105.8	193.9	(11%)
D	Withdrawn	24.5	49.9	103.6	448.0	626.0	(37%)
	High	5.5	10.2	4.3	21.0	41.1	(2%)
	Moderate	20.9	43.8	49.3	80.7	194.7	(11%)
	Low	97.2	142.3	135.8	468.9	844.2	(50%)
E	Withdrawn	40.1	62.1	154.3	458.4	714.9	(42%)
	High	31.8	71.0	82.6	200.4	385.8	(23%)
	Moderate	1.4	11.1	1.1	9.8	23.4	(1%)
	Low	74.8	102.0	55.0	350.1	581.9	(34%)
F	Withdrawn	27.0	51.3	112.2	450.0	640.5	(38%)
	High	39.5	55.3	82.7	105.9	238.4	(16%)
	Moderate	37.6	82.0	19.5	123.5	262.6	(16%)
	Low	44.0	57.6	78.6	339.3	519.5	(30%)
G*	Withdrawn	27.0	51.3	112.2	450.0	640.5	(38%)
	High	21.1	44.9	28.1	48.9	143.0	(8%)
	Moderate	33.2	58.3	56.9	234.1	382.5	(22%)
	Low	66.8	91.7	95.8	285.7	540.0	(32%)
H	Withdrawn	27.0	51.3	112.2	450.0	640.5	(38%)
	High	32.2	28.5	98.2	98.2	257.1	(15%)
	Moderate	48.9	67.7	35.9	289.2	441.7	(26%)
	Low	40.0	98.7	46.7	181.3	366.7	(25%)
I	Withdrawn	40.1	62.1	154.5	464.9	721.6	(42%)
	High	30.3	77.2	82.8	181.9	372.2	(18%)
	Moderate	12.2	28.1	10.0	97.6	147.9	(7%)
	Low	65.5	78.8	45.7	274.3	464.3	(23%)

1/ Grant (1982) and Lentz (1985).
2/ For definition see Footnote, 2 pages prior to this page.
3/ Includes all statutory and administrative withdrawals and recommended adjustments.
4/ Includes the NCSH, Semi-Primitive Recreation, RNA, and Developed Recreation prescriptions.
5/ Includes Wildlife prescriptions, and areas having a Visual Quality Objective (VQO) of retention or partial retention.
6/ Includes General Forest and timber-oriented prescriptions having a VQO of modification.
* The G departure alternative is equivalent to Alternative G.

All alternatives would discourage or inhibit mineral exploration and development in some of the areas of known high and medium-high mineral potential. Alternative C would include the most acreage (220,000), and Alternative D the least acreage (90,000) of high and medium-high mineral potential in withdrawals and "highly restrictive" management prescriptions.

Table IV-8 summarizes the effects each alternative would have on minerals exploration and development. Also included is an "accessibility factor" used to facilitate a comparison of the alternatives. Alternative A, current direction, is taken as the standard to which the others were compared. This alternative would be the sixth least restrictive of the ten alternatives. Five alternatives would offer better minerals accessibility, four poorer.

TABLE IV-8 Summary of Effects of Alternatives on Minerals Exploration and Development

Alternative	Accessibility Factor 1/	Degree of Mineral Encouragement
A	"Standard"	Minerals encouragement of the current direction alternative would be Moderate relative to the other alternatives. Although roadless acreage is at a minimum, minimal Forest Service road construction and large areas having high visual quality levels negate this positive effect.
B	+ 4%	Moderate - The larger acreage of low restriction land allocations and the attendant increase in roading would be offset by larger areas with roadless prescriptions, particularly in high and medium-high potential mineral areas.

Alternative	Accessibility Factor 1/	Degree of Mineral Encouragement
C	-29%	Low - Recommended withdrawal of the NCSH, large areas having restrictive roadless, high VQO and wildlife prescriptions would all combine to strongly discourage minerals exploration and development.
D	+39%	High - Minimizing withdrawals, roadless areas and other restrictive prescriptions, as well as a maximum of road development on the forest, would offer strong encouragement to mineral operators.
E	- 2%	Moderate - Recommended withdrawal of the NCSH and a maximum of roadless areas would be counterbalanced by the near absence of moderately restrictive visual and wildlife prescriptions and a large acreage of low restrictions.
F	- 1%	Moderate - Larger roadless areas in this alternative would be tempered by improved forest roading and low restrictions in many areas.
G	+14%	Moderate-High - Minerals accessibility would be improved relative to Alternative A mainly because of increased allocation of high and medium-high minerals areas to less restrictive prescriptions.
G Depart		Same as Alternative G.
H	+12%	Moderate-High - Large areas of moderately restrictive wildlife prescriptions (deer winter range and lynx) in this alternative would be overcome by the positive effects of minimal withdrawals and roadless areas, and improved forest roading.

Alternative	Accessibility Factor 1/	Degree of Mineral Encouragement
I	- 8% (?)	Moderate-Low - Alternative I would significantly discourage minerals development by withdrawing the NCSH and allocating large acreages to roadless recreation. The reported -8% is probably high, however, as this alternative proposes to withdraw environmentally sensitive areas and recommends additional restrictions on minerals. These could not be mapped or quantitatively analyzed and are not reflected in the accessibility factor.

1/ The accessibility factor was calculated by adding three times the sum of the high and medium-high mineral potential acreage having low access restrictions; two times the sum of the high and medium-high mineral potential acreage having moderate access restrictions; one times the sum of high and medium-high mineral potential acreage having high access restrictions; and subtracting the sum of high and medium-high mineral potential that is withdrawn. These values were compared to that of Alternative A and expressed as a positive (greater than A) or negative percentage (less than A).

Recommending new withdrawals or the revocation of existing mineral withdrawals is the only real way the Forest Service can directly influence minerals activities on forest lands. Presently 642,000 acres (38%) of the Okanogan National Forest is withdrawn from mineral entry (Table IV-9). Locatable, leasable and saleable mineral acquisition and development is prohibited in essentially all of these lands with the exception of administrative and power withdrawals. These are open to salable mineral entry (at the discretion of the administrating agency) and to mineral leasing. In addition, power withdrawals may permit restricted locatable entry.

All alternatives would recommend revocation of about 3,200 acres of administrative and power withdrawals.2/ Alternatives C, E and H would propose to withdraw 74,000 or more acres (mainly the NCSH) including 14,000 acres of high and 11,000 acres of medium-low mineral potential. These represent 12 and 6 percent, respectively, of the total unwithdrawn acreage in each category. Alternative D would provide for the least area of withdrawal, 626,000 acres, while Alternative I would provide for the most, 721,600 acres (does not include environmentally sensitive areas).

2/ All existing withdrawals must be reviewed by 1991 under Section 204(1) of FLPMA (90 Stat. 2754). The resulting withdrawal recommendations are not expected to vary substantially by alternative.

TABLE IV-9 Summary of Mineral Withdrawals, Including Recommended Adjustments for the Alternatives in Acres (x 1000)

Withdrawal Type	Present Status	Alternatives								
		A	B	C	D	E	F	G 1/	H	I
Power	1.0	0	0	0	0	0	0	0	0	0
Administrative	3.9	1.6	6.0	0.3	1.6	1.6	1.6	1.6	1.6	8.3
NCSH	13.2	13.2	13.2	87.6	0	87.6	13.2	13.7	87.6	87.6
Wilderness	625.7	625.7	625.7	625.7	625.7	625.7	625.7	625.7	625.7	625.7
TOTAL AC (% of Forest)	642.8 (38%)	640.8 (38%)	640.5 (38%)	719.3 (42%)	626.0 (37%)	714.9 (42%)	640.4 (38%)	640.5 (38%)	714.9 (38%)	721.6 (42%)

1/ The G departure alternative is equivalent to Alternative G.

The environmental effects of mineral activities on other forest resources is dependent upon the activity proposed, whether exploration, mining or mineral processing; and the sensitivity of the proposed area of operation. Generally, prospecting and early exploration activities have little effect on other resources because of greater flexibility of access and equipment use at that stage. Actual mineral extraction may have minimal to great interaction with other resources, depending on the mineral being removed and the methods used.

Current activities on the forest include mainly claim staking, prospecting and exploration. This level of activity is expected to continue, ultimately resulting in the development on producing mines. Predicting the nature and location such developments is highly speculative at this stage. Consequently specific environmental consequences of potential mineral developments by alternative cannot be properly evaluated. Environmental impacts of these and other proposed mineral activities will be evaluated on a project basis via a separate environmental analysis at the time of proposal.

ENERGY REQUIREMENTS

Direct and indirect, as well as short-term versus long-term energy requirements would be affected by the alternatives. Direct energy requirements include those which are required for forest management, extraction (logging), construction and maintenance of roads, transport of wood to mills, forage and structural improvements of range, cattle transport, permittee travel, recreationist's travel and on-site requirements (camping, boating, snowmobiling, etc.), fuel treatment, expected initial attack of fires, expected suppression activities, expected timber losses, as well as structural losses.

Indirect energy requirements include processing of wood products, transport of products to consumers and on-site processing such as building construction. Energy required for such things as building logging trucks and automobiles are indirect, but are not considered in these calculations.

All alternatives, except Alternatives B, D and G-departure, would require about the same (Alternative F) or less energy for implementation in the short-term (Table IV-10). Energy requirements of all alternatives except the two departure alternatives (A and G-departure) would gradually increase over time as more people use the National Forest. The two departure alternatives would consume less energy in the future (after the plan period of the next 10 years).

Table IV-10 Projected Average Annual Energy Consumption of the Alternatives in Billions of BTU's for the 10-year Plan Period

Alternative	Energy
A	3463
B	3510
C	2955
D	3920
E	3036
F	3435
G	3199
G-departure	3564
H	3257
I	2641

AIR QUALITY CONSEQUENCES

The Okanogan National Forest would continue to be dependent on prescribed fire to meet timber, wildlife, range and fuel hazard reduction objectives for all alternative. The presence of smoke during prescribed burning would limit visibility in the immediate area. The impacts of prescribed burning on visibility would be short-term.

Utilization of a portion of the woody residues created through timber management activities would be accomplished through the forest's firewood program in all alternatives. This use of woody residues for firewood would not appreciably reduce, in the short-term, the need for disposal by prescribed burning for all alternatives. Burning is, however, considered as a last resort to other fuel treatment methods currently available.

The cutting of firewood on the National Forest by local residents has had an impact on the air quality in adjacent towns and heavily populated rural areas. Currently, combustion of wood for space heat and loss of localized air quality during winter temperature inversions is a critical issue within the Methow Valley. The forest's prescribed burning program would not contributed to this problem because the forest normally burns during the spring and fall months, which is outside of the severe temperature inversion periods.

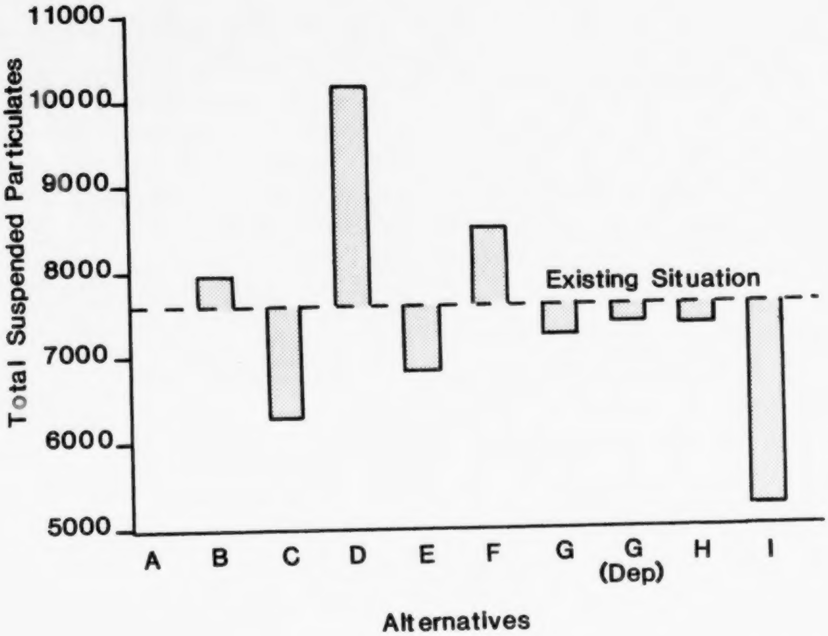
Estimates of how much firewood from National Forest land is contributing to the degradation of air quality are hard to make. The destination of wood cut on the National Forest is unknown. It is assumed that the demand for firewood would be the same for all alternatives, therefore, the effects would not vary by alternatives.

A reduction in the level of burning to meet air quality goals may adversely affect the forest's ability to meet resource management objectives and protection standards. If fuel residues are not promptly treated or treatment is deferred for longer periods of time, the probability increases for the occurrence of large destructive wildfires. Such wildfires, historically, have a much more pronounced negative affect on air quality than prescribed burning. The possibility of reduction would apply to all alternatives and, therefore, the effects would be the same for all alternatives.

The production of Total Suspended Particulates (TSP) emissions from prescribed burning operations is the single major source of air quality degradation as a direct result of the Forest's management practices.

The Forest's current prescribed burning program produced approximately 7,600 tons per year of Total Suspended Particulate emissions. Alternative D would produce the greatest amount of TSP emissions compared to the existing condition. Alternatives C and I would produce the least. The level of production of TSP emissions for the remaining alternatives would vary little from the existing condition.

FIGURE IV-4 Annual Total Suspended Particulate Matter Emission Production by Alternative



The impacts associated with the loss of visibility are felt the most by Forest recreationist who desire uninterrupted viewing of major landscape features. Loss of recreation experience levels due to loss of viewing distances would be minimal. Alternative D would have the greatest impact on existing visibility. Alternatives B, F and H would reduce overall visibility slightly. The remaining alternatives would have no effect on existing visibility, and in some instances would improve overall visibility slightly compared with the existing condition for the forest.

The level of visibility impairment is directly proportional to the amount of material consumed by burning which is proportional to the amount of Total Suspended Particulate emissions produced. The amount of consumption varies by the environmental conditions that affect how the fuel will burn. This includes the weather variables of temperature, atmospheric humidity, moisture content of the dead fuel, and wind.

The timing and duration of the impairment is dependent on the season of burning. Burning during the spring and summer months would allow for greater dispersion of the smoke. Atmospheric mixing conditions would be much better and retention of the smoke in the major drainages would be short-term. Burning during the fall months would produce higher levels of smoke concentrated within the valley bottoms due to the meteorological conditions associated with temperature inversions. Normally recreation use would decline during the fall months and therefore the loss of visibility would not be experienced as much.

In all alternatives the Forest would also attempt to make reasonable progress towards reducing its Total Suspended Particulate emission production levels. In most cases, National Ambient Air Quality Standards would not be violated. Extensive modeling and/or monitoring will be required to determine if Federal and State Standards are being violated for Total Suspended Particulate emissions.

MITIGATION MEASURES

Manipulating the season of burning would have a direct effect on the reduction of the Total Suspended Particulate emissions produced. More spring burning would consume less of the available fuel, and this fact combined with the removal of the heavier woody residues from the site prior to burning would further reduce the amount of wood waste to be burned and the subsequent emissions produced. The latter would be principally accomplished by making more firewood readily available to local residents.

Administratively the mitigation of visibility impairment would be accomplished by limiting burning activities on high use recreation days, which include holidays and weekends. The basis for the mitigation would be the Forest's adherence to the guidelines described in the State of Washington Implementation Plan for visibility protection of Class I areas and the State of Washington Smoke Management Plan.

Future demand for firewood and utilization of wood wastes for wood fiber would substantially reduce the amount of forest residue requiring treatment with prescribed fire. This would vary by alternative based on the level of harvest and amount of waste wood produced. With the identification of new potential markets for previously unutilized wood residues from timber harvest and timber stand improvement projects, the level of residue requiring disposal by fire should be substantially reduced. As additional mitigation, an incentive system would be developed to allow potential purchasers to make a profit from this wood resource. Currently no such incentive system nor markets exists on the Okanogan National Forest. This situation would exist for all alternatives.

The use of a confinement wildfire suppression strategy within the wilderness and semi-primitive recreation areas on the forest would likely result in short-term impacts on visibility within these management areas. Such impacts do not detract from the overall resource management objectives established for these areas.

FIRE PROTECTION AND FIRE USE CONSEQUENCES

FIRE SUPPRESSION

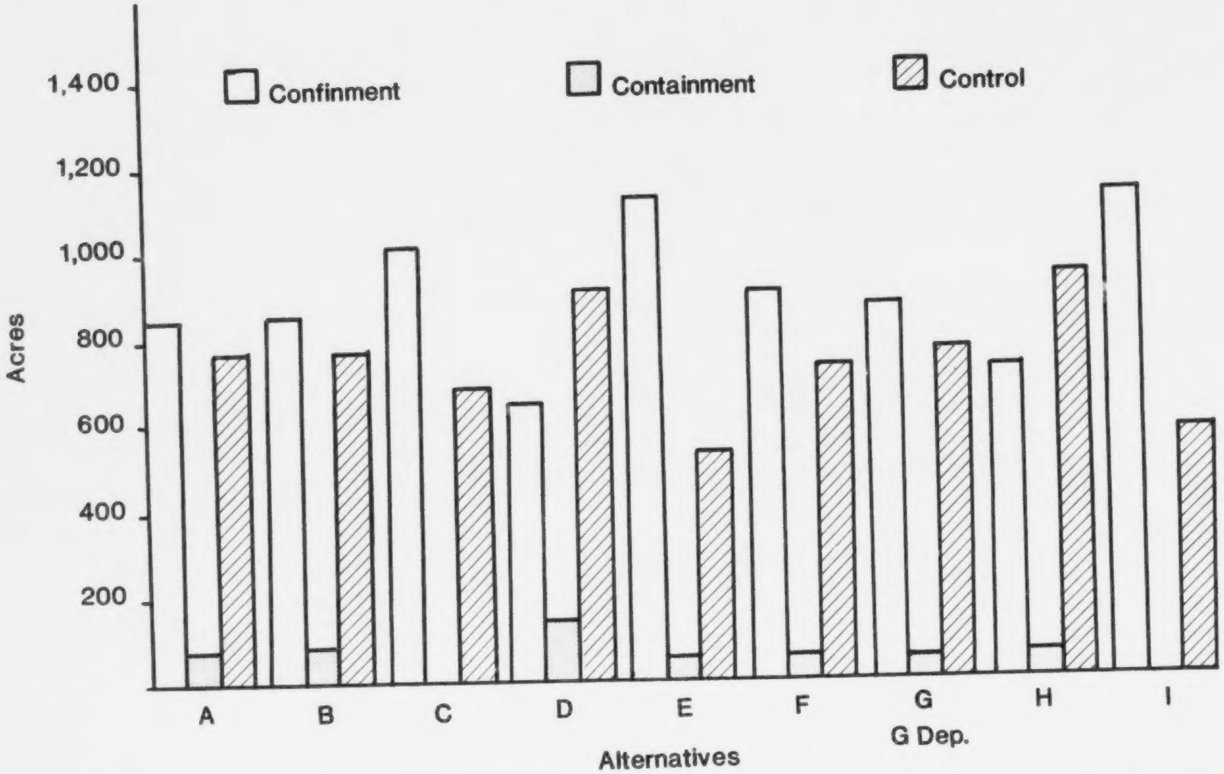
All alternatives would establish levels of fire protection (i.e. wildfire suppression) based on resource values protected, potential suppression cost, threat to the public and capital investments, and the positive and negative effects of wildfires on the resource management objectives of each management area. The three levels of protection (i.e. fire suppression strategies) are confinement, containment and control as discussed in Chapter III - Fire Suppression and Fire Use (see Figure IV-5 Amount of Each Fire Protection Strategy by Alternative).

The application of different fire suppression strategies would provide for a more intensive fire suppression response in the management areas of highest dollar value and public use (e.g. timber management, scenic viewsheds and developed recreation sites). Fire would play a more natural role in wilderness and semi-primitive recreation areas, where individual fires would be allowed to burn to natural barriers and fuel-breaks. This minimizes total suppression cost where resource values are the lowest.

The current fire management direction reflects the change in fire suppression policy which requires an assessment of the most cost beneficial approach to wildfire suppression. Current Situation fire management direction is documented by the *Appropriate Suppression Response Implementation Plan*, USDA Forest Service, Okanogan National Forest, 1983. (This plan will be rewritten to reflect the preferred alternative after the FEIS.) The selection of the appropriate suppression response by management area is based entirely on minimizing the cost of fire suppression by comparing it against the expected resource loss. The final selection of the appropriate suppression response must be supported by the resource management objectives of the management area. The use of wildfires (i.e. lightning and person-caused fires) to accomplish land and resource management objectives is not a part of any alternative.

All alternatives would allow lightning fires to burn under a confinement strategy in the wilderness management areas. Both lightning and person-caused fires would be managed under the confinement fire strategy within the majority of the semi-primitive recreation areas, North Cascade Scenic Highway and mountain goat habitat management areas. However, if any wildfire within these management areas has the potential to leave the area or would pose a threat to public safety, capital investment or cultural resources found within the area, the wildfire would be contained or controlled.

FIGURE IV-5 Amount of Each Fire Protection Strategy by Alternative



All alternatives, except Alternatives D and H, would increase the area in which confinement fires would be allowed above the Current Situation. The actual percent increase varies from a 4% increase for Alternative A (Current Direction) to 28% increase for Alternatives E and I. Alternatives E and I would emphasize semi-primitive recreation which accounts for the increase in total acres on which the confinement strategy would be allowed.

The fire suppression strategy for the remainder of the management areas would be containment and/or control. Alternatives D and H would emphasize a control strategy because of the emphasis on timber management.

The expected cost of fire suppression and acres burned by wildfire would vary by alternative depending on the application of the confinement, containment and control strategies. The cost of a control action would normally the most expensive suppression response because it requires an all out effort to limit total acres burned and requires total extinguishment of the wildfire. A control response would be applied where the potential resource loss is greater that the expected cost of suppressing the wildfire.

Containment would be the primary suppression strategy for the range management area where no timber harvest is scheduled. The containment strategy would also be selectively applied to those management areas where the expected damage caused by the wildfire is less than the cost for a full suppression (i.e. control) response. This would normally be applied early and late in the fire season when moister conditions reduce the fire damage potential. Containment can also be used in timber stands that are tolerant to fire. An example would be in a ponderosa pine stand that has light fuel (i.e. grass) in the understory. See Chapter III, Biological Environment, for more specific information on the natural role of fire within the ecosystems commonly found on the Okanogan National Forest.

The use of containment would afford the best opportunity to reduce direct suppression costs. This would be accomplished by reducing the level of mop-up (i.e. cooling of all hot embers until the fire is dead out) and through the use of natural terrain features (i.e. roads, non-vegetative areas, streams, etc.) to contain the fire's spread without actually constructing fireline. These two activities (mop-up and fireline construction) account for the greatest expenditure of dollars during wildfire suppression.

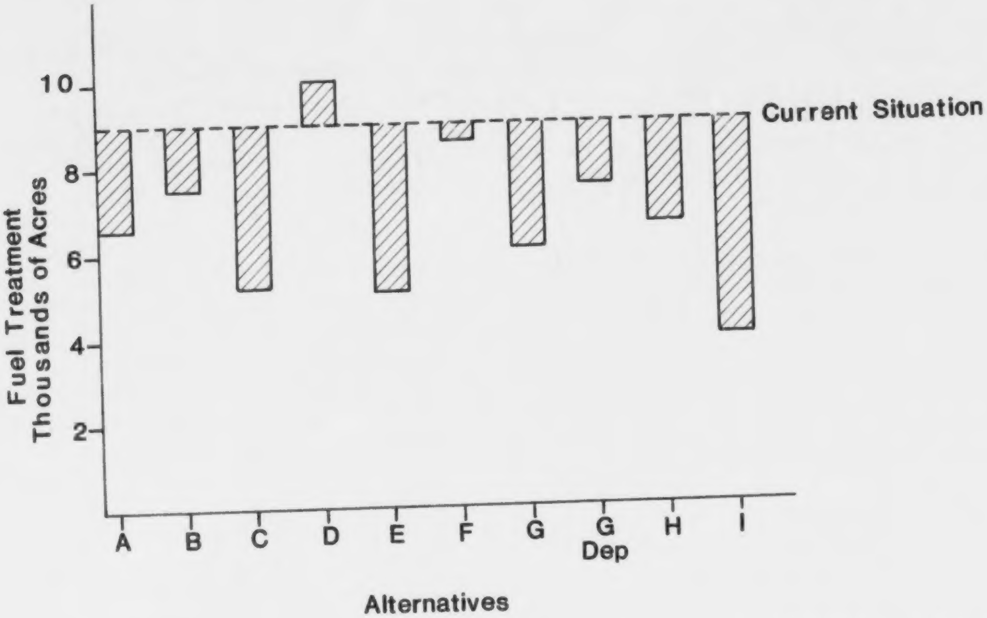
The confinement suppression strategy would normally not require a direct suppression action other than surveillance. The areas within which confinement would be applied are normally inaccessible to traditional fire suppression resources and would rely on the more expensive aerially- delivered firefighters (i.e. smokejumpers). The cost of direct suppression (i.e. containment or control) would far exceed the expected resource value loss within the areas identified for the use of the confinement fire strategy. The application of this strategy, by alternative, would be based on economic efficiency criteria alone and not on meeting the resource objectives of these management areas.

The total variation in protection cost from one alternative to the next would be based on the total number of acres within each management area and the application of each fire suppression strategy. The performance of each alternative would be difficult to predict based on the variability of weather and fire starts from one year to the next.

FUEL TREATMENT

All alternatives, with the exception of Alternative D, would show decreases in the total acres requiring fuel treatment compared to the Current Situation. These decreases would reflect a general decrease in timber harvest levels from the Current Situation. The total fuel treatment acres included in Figure IV-6 below would be those generated from timber harvest activities only and do not include the use of prescribed fire in support of wildlife, range and timber stand improvement projects. A portion of the acres identified would either be treated by mechanical means (not requiring the use of prescribed) or would not be treated at all. The actual acres are difficult to determine.

FIGURE IV-6 Comparison of Average Annual Fuel Treatment Acres by Alternative for the Period 1986-2000



The use of prescribed fire would have a direct effect on the micro-environment as well as on the air quality in and adjacent to the project area. Microclimatic and Air Quality effects are discussed within the Microclimate and Air Quality section of this chapter.

The actual removal of the forest vegetative layer during harvest operations would be responsible for the greatest change in microclimate. Most of the prescribed burning microclimate effects would concern the loss of soil moisture and soil structure during the burning operation and the change in surface soil color and texture. Increased surface temperatures would occur due to the black body absorption of the burned residual material left after burning. Normally sufficient dead shade would remains on the site to mitigate the extremes in temperature that affect seedling survival after planting.

Timber management activities in lodgepole pine and associated species and natural stands within roadless areas would increase the diversity of age classes within these stands and reduce the natural fuel buildup, thereby reducing the overall fire hazard (i.e. flammability) and potential for large destructive wildfires. Alternatives D and H would have the greatest impact on reducing overall fire hazard in the long-term. Alternatives C, E and I would least reduce total fire hazard.

The fire risk would be the greatest, in the short-term, in Alternative D due to the increase in fuel hazard from timber harvest activities from the Current Situation.

An increase in person-caused fire risk would be the same for all alternatives and would be specifically linked to the construction of the Early Winters Destination Ski Resort, in the Methow Valley, and the continuation of the general construction trend for summer and permanent housing on private land adjacent to the Forest. This risk would manifest itself through an increase in the frequency of person-caused wildfires spreading from State-protected land onto the Forest at this "rural/urban interface" which would be expected to increase through the next decade.

INFRASTRUCTURE IMPROVEMENTS

On the Okanogan National Forest, roads are currently constructed primarily to reach unaccessed timber. Roads are therefore directly affected by, and vary with, the timber harvest level and the location of the proposed timber harvest.

All alternatives would require increasing the local road mileage above the existing inventory in both the short and long-term, thereby accessing more acres. None of the alternatives would require increasing arterial and collector road mileage above the existing inventory. However, all alternatives would require some arterial and collector reconstruction to upgrade access into areas with little previous timber harvest or to accommodate concurrent use by recreation traffic and commercial haul. Arterial and collector reconstruction by itself would not change the acres of National Forest accessed.

Graph in Chapter II displays acres accessed within roadless areas for Alternatives A through I.

Roads have effects on other resources. Any increase in road mileage or acres accessed will have corresponding effects on:

- soil; accelerated erosion
- water; increased turbidity
- wildlife habitat; degradation or destruction
- wildlife; displacement
- timber; loss of acres but increased management
- range; animal harassment, loss of acres, introduction of noxious weeds, but increased ease of administration
- recreation; roads change the character of recreation such as from semi-primitive motorized to rural

The effects of road construction on these resources is discussed under the corresponding resource section.

WILDERNESS

All alternatives would maintain 626,200 acres in the Pasayten and Lake Chelan-Sawtooth Wildernesses. The area available for future wilderness consideration would vary between alternatives. While there is some variation in the year 2000, future years show considerable variation. Additional information on the future status of roadless areas is provided under the Roadless Area section of this chapter and in Appendix C.

All alternatives would allow natural and ecological processes to operate freely to retain natural vegetative cover.

All alternatives would provide for the use, enjoyment and understanding of wilderness by providing a range of opportunities from trailless to trailed (See Wilderness Supply Potential - Chapter III). Trailless opportunities would generally be confined to the western portion of the Pasayten Wilderness where large blocks of land currently have no or few trails. The remaining portions of the Pasayten and Lake Chelan-Sawtooth Wildernesses would generally provide limited trailed and trailed opportunities. These limited trailed and trailed opportunities could adversely affect vegetation, soil, water and wildlife populations. Potential affects would be mitigated by keeping the type and amount of visitor use within the carrying capacity of the area by visitor education and by implementing direct visitor controls where necessary. All alternatives would allow for outfitter-guide operations where it is determined they are necessary to accomodate public use.

All alternatives would provide for trails necessary to protect the wilderness resource while meeting the objectives of the Wilderness Act. Alternatives A, B, E, F, G, G (Departure), H and I would maintain the emphasis on upgrading the existing trail and trailhead system based on wilderness objectives. Individual trail standards would be based on type of user and degree of difficulty objectives. New trail construction would generally be confined to relocation of trails not currently in the proper location. This would reduce adverse effects to soil, water, vegetation and wildlife. Trails not necessary to meet wilderness objectives would be eliminated and the area returned to a natural condition. These alternatives would accommodate increased use levels, particularly in the Pasayten Wilderness. Alternative C would slightly increase trail access in those areas not managed for trailless opportunities while continuing the emphasis on upgrading the existing trail system. This alternative would also accommodate increased use levels. Alternative D would decrease trail access, particularly in those areas away from major routes and also decrease the emphasis on upgrading the existing trail system. This alternative would not accommodate increased use levels.

All alternatives would provide an environment where forces of natural selection and survival of wildlife species operate with freedom. All alternatives would provide for maintaining animals and fish indigenous to the wilderness and would provide protection for populations of threatened and endangered species and their habitats.

New commercial livestock grazing allotments would not be created under any alternative, but commercial livestock grazing operations and activities, and facilities necessary to support these operations would continue to be authorized on existing allotments within the Pasayten and Lake Chelan-Sawtooth Wildernesses. All alternatives except C, I and D would maintain current grazing levels. Alternative C would decrease grazing levels where possible without adversely affecting permittee operations. Alternative I would decrease grazing levels to enhance wilderness values. Alternative D would increase grazing levels to that which existed at the time of wilderness designation while protecting soil and water values. Under all alternatives, permitted grazing activities would be managed under the Congressional Guidelines on "Grazing in National Forest Wilderness Areas." Over time, plant communities on grazed land would be different than those on similar but ungrazed land.

All alternatives would manage watersheds to allow natural processes to dominate. Plant cover modification or treatment of soil mantles to supplement natural water yields would be inappropriate.

All alternatives would allow for mineral exploration and development subject to valid existing mineral rights. Valid existing rights in the Pasayten Wilderness are those which existed prior to January 1, 1984. Valid existing rights in the Lake Chelan-Sawtooth Wilderness are those which existed prior to wilderness designation on July 3, 1984. Permits could be issued for investigating indirect evidence of mineral resources.

All alternatives would phase out structures not necessary for wilderness purposes or administration.

Management activities outside wilderness would influence the amount of use an area receives. Alternatives which provide higher standard roads to trailheads or additional roads near the wilderness boundary would increase use the most. Cumulatively, Alternative D would increase road access to the wilderness boundaries the most, followed by Alternatives B, H, F, G and G (Departure), C, A, E and I. Potential effects would be mitigated by constructing lower standard roads or by closing roads to public use at the end of a project.

Natural fire has played a major role in shaping the ecosystem of both the Pasayten and Lake Chelan-Sawtooth Wildernesses. Under all alternatives both areas would be managed under a confinement fire strategy. This could lead to temporary disruption of public use on a fire-by-fire basis. Short-term visual impacts would also occur. Although not the primary objective, the confinement strategy would better perpetuate the natural ecosystem than would a containment or control strategy.

ROADLESS AREAS

The amount of roadless area remaining in the future is dependent on the goals and objectives for each alternative. The future condition of inventoried roadless areas would vary by alternative based on the amount of roading and vegetation manipulation which would occur. The disposition of the total inventoried roadless acreage is shown in Table IV-11. For the disposition of and the environmental consequences of individual roadless area management, refer to Item 6 under the individual area write-ups in Appendix C.

TABLE IV-11 Disposition of Total Roadless Acres by Management Area by Alternative

Management Area	Alternative									
	A(Cur Dir)	B	C	D	E	F	G	G(Dep)	H	I
	thousand acres									
1	109	237	-	385	-	212	127	127	-	-
4	105	107	238	-	328	150	105	105	-	393
4m	26	26	50	-	82	37	26	26	-	-
5	149	8	14	96	-	-	46	46	-	-
6	-	-	71	-	71	-	-	-	-	71
7	71	71	-	-	-	71	71	71	71	-
8	*	5	2	*	*	*	5	5	5	5
9	21	13	22	-	-	11	13	13	27	2
10	-	-	9	-	-	-	15	15	9	-
12	-	-	33	-	-	-	63	63	127	-
14	-	14	42	-	-	-	10	10	242	8
18	-	-	-	-	-	-	-	-	-	2
Total	481	481	481	481	481	481	481	481	481	481

* 150 acre Wolf Creek Research Natural Area

All alternatives except E would reduce the amount of inventoried roadless area on the National Forest. Cumulatively, the most reduction would occur with Alternative D, followed by Alternatives H, A, B, G and G (Departure), F, C and I.

The scheduling of timber harvest entries and road access into roadless areas would determine the number and size of areas remaining in a roadless condition over and above that which would be allocated to unroaded management areas in the year 2000 (Table II-3a - Chapter II). All alternatives except E and I would schedule timber harvest entries and road access and reduce the amount of roadless area by that time. Cumulatively, the most reduction would occur with Alternative D followed by Alternatives B, F, H, G (Departure) A, G and C. Roadless areas still meeting minimum requirements would be considered for wilderness recommendation at that time as part of the next cycle of planning.

For a discussion of the environmental consequences of roadless area management by alternative on non-wilderness resources, refer to the specific resource section in this chapter.

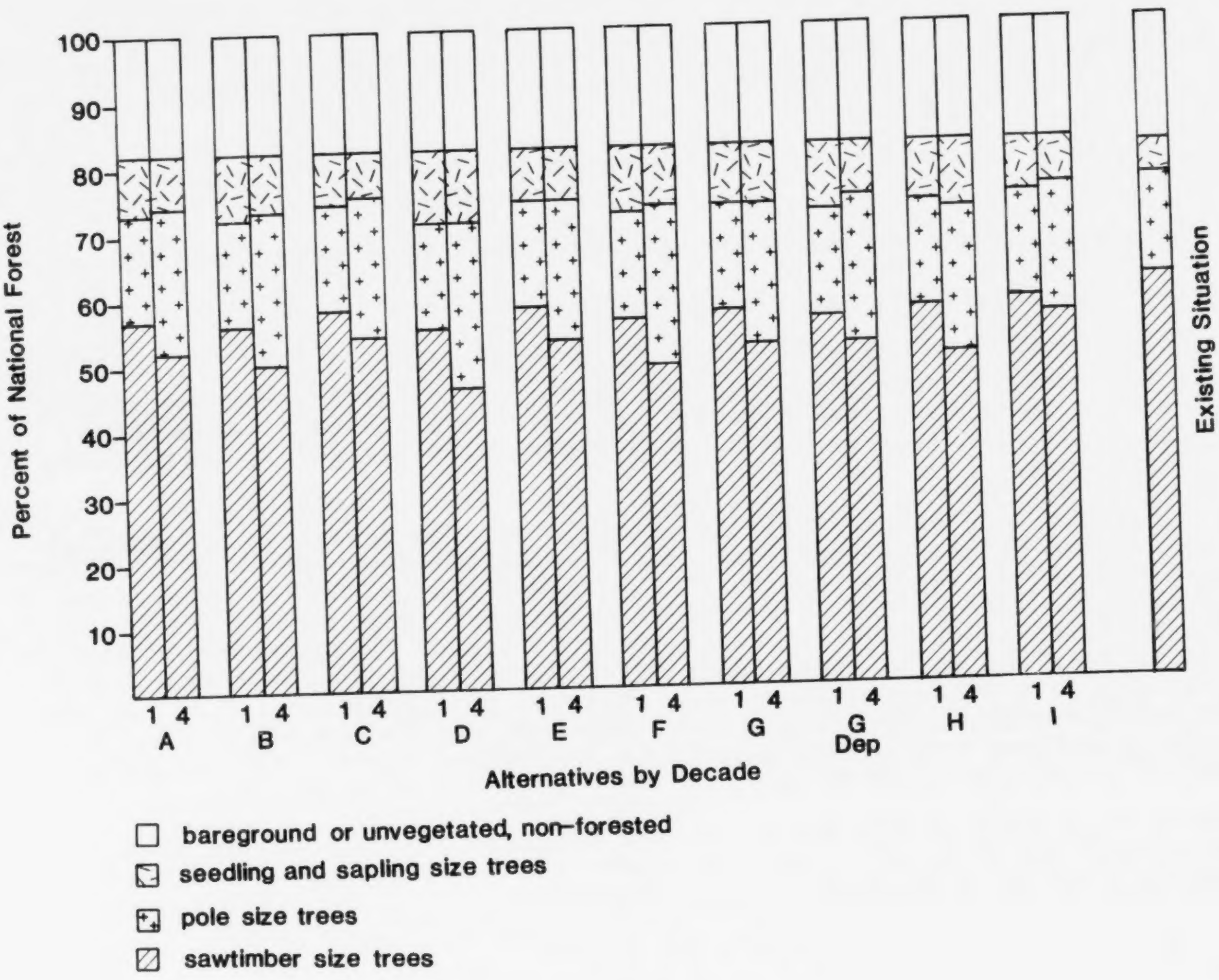
BIOLOGICAL CONSEQUENCES

This section presents the consequences of each of the alternatives on the biological environment. Implementation of each of the alternatives would result in change to plant and animal communities.

DIVERSITY OF PLANT COMMUNITIES

Changes in plant diversity occur mainly through timber management, wildfire, range management and fire management activities. Forested areas outside of wilderness are the areas where most changes in vegetative conditions would occur. Change in kind and amount of plant species which are present across the forest is expected to be small. However, change in structure and age of vegetative communities is expected to be more noticeable. Assuming minor effects from wildfire, range management and fire protection, the effect of timber harvest and its associated practices is shown in Figure IV-7.

FIGURE IV-7 Diversity of Vegetative Condition by Alternative in Decades 1 and 4, Forestwide



Regeneration harvesting replaces mature forest vegetation with younger vegetation. Initially bare soil occurs over much of the area. Within a short time, generally less than two years, grasses, forbs and shrubs occupy the site. As tree seedlings become established and grow they will in most cases dominate the site and crowd out most of the other vegetation. Clearcutting removes all forest vegetation during the harvest operation. Seed tree cutting removes all but a few mature trees that are retained to provide seed. Shelterwood cutting retains several mature trees to provide seed and a protected microclimate for young seedlings. Microclimate is discussed in Chapter III and elsewhere in this chapter. Mature trees retained following seed tree and shelterwood cutting are harvested in 6 to 10 years when they are no longer needed. Clearcutting and seed tree cutting create conditions which favor tree species such as lodgepole pine, ponderosa pine, western larch, and to a lesser degree Douglas-fir. Shelterwood cutting is used on sites where amelioration of harsh microclimate conditons is desired in order to provide conditions conducive to tree regeneration. In mixed conifer stands in all alternatives clearcutting, seed tree cutting, and shelterwood cutting would all be used. Minor amounts of overstory removal cutting would occur in all alternatives during the next 10 years. Clearcutting would be the primary cutting method used in lodgepole pine stands in all alternatives.

All alternatives would provide a distribution of successional stages throughout the National Forest.

FOREST

The primary effect each alternative would have on forested ecosystems outside of wilderness and roadless areas during the next 10 years would be through timber harvest and related activities (see Diversity of Plant Communities previous to this section for further information).

It is the National Forest's experience that managing forested lands to produce multiple outputs often results in much higher timber management costs. Mills et al (1985) showed that decreasing harvest unit sizes to meet multiple-use objectives greatly increased the costs of timber management. The attendant benefit to increased cost is improved wildlife habitat, attractive scenery for forest visitors, higher water quality and greater amounts of forage produced to feed grazing cattle and sheep. Harvest unit size, proximity to roads, ability to manipulate competing vegetation, and constraints on the time of year when logging may occur strongly influence the cost of doing business. Harvest unit sizes may be reduced in riparian areas and in areas where scenic values are high. High wildlife values such as in deer winter range may mean a reduction in road access is desirable. The time of the year when logging or other timber management activities can occur may be constrained during periods of high recreation use, high soil moisture when soil damage might occur, and during periods critical to wildlife life-cycles such as fawning, nesting and winter survival.

GROWTH AND STANDING VOLUME

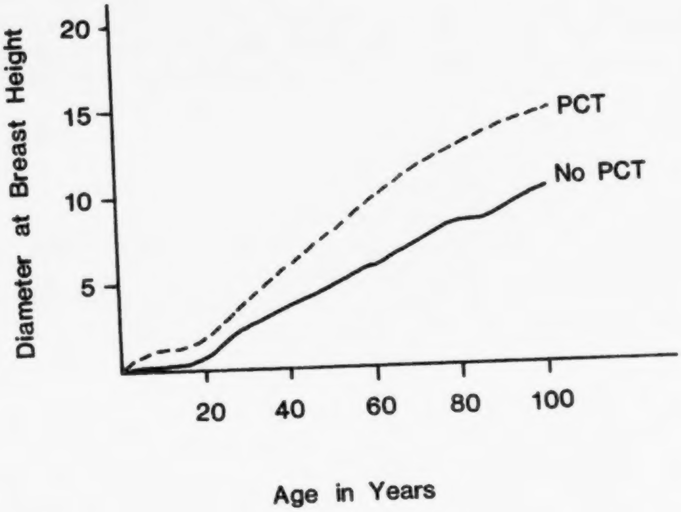
Growth rates of trees can be increased by precommercial or commercial thinning of immature timber stands. Regenerating existing stands of mature trees would also result in increased long-term growth rates.

Precommercial Thinning

Precommercial thinning concentrates wood growth on a few selected trees. Trees cut in a precommercial thinning are too small to be used commercially. They are generally left in the forest to decompose and return nutrients to the soil. By increasing height and diameter growth on selected trees, precommercial thinning produces larger trees in a shorter time than under natural conditions (Figure IV-8). Precommercial thinning decreases forest crown cover and permits sunlight, rain and snow to reach the ground. Soil moisture available for plant growth is often higher following thinning. Ground vegetation such as grasses, forbs and shrubs often increase dramatically following thinning. From 25 to 45 years after precommercial thinning, tree crowns close sufficiently to once again inhibit growth of understory vegetation.

The largest timber volume increases would occur in Alternative D, followed by Alternatives F and H. Alternatives I and C would experience the least growth increase from precommercial thinning. Relative acres precommercial thinned by alternative are shown in Figure II-3, in Chapter II of this document. Volume increases in FORPLAN result from increased growth caused by thinnings in future decades. Thinnings accomplished during the next two decades were not part of the FORPLAN analysis.

FIGURE IV-8 Tree Size With and Without Precommercial Thinning in Mixed Conifer Stands



Commercial Thinning

Much like precommercial thinning, commercial thinning is a practice that removes some trees to concentrate growth on remaining trees. The difference between the two treatments is that trees cut in commercial thinnings are used commercially.

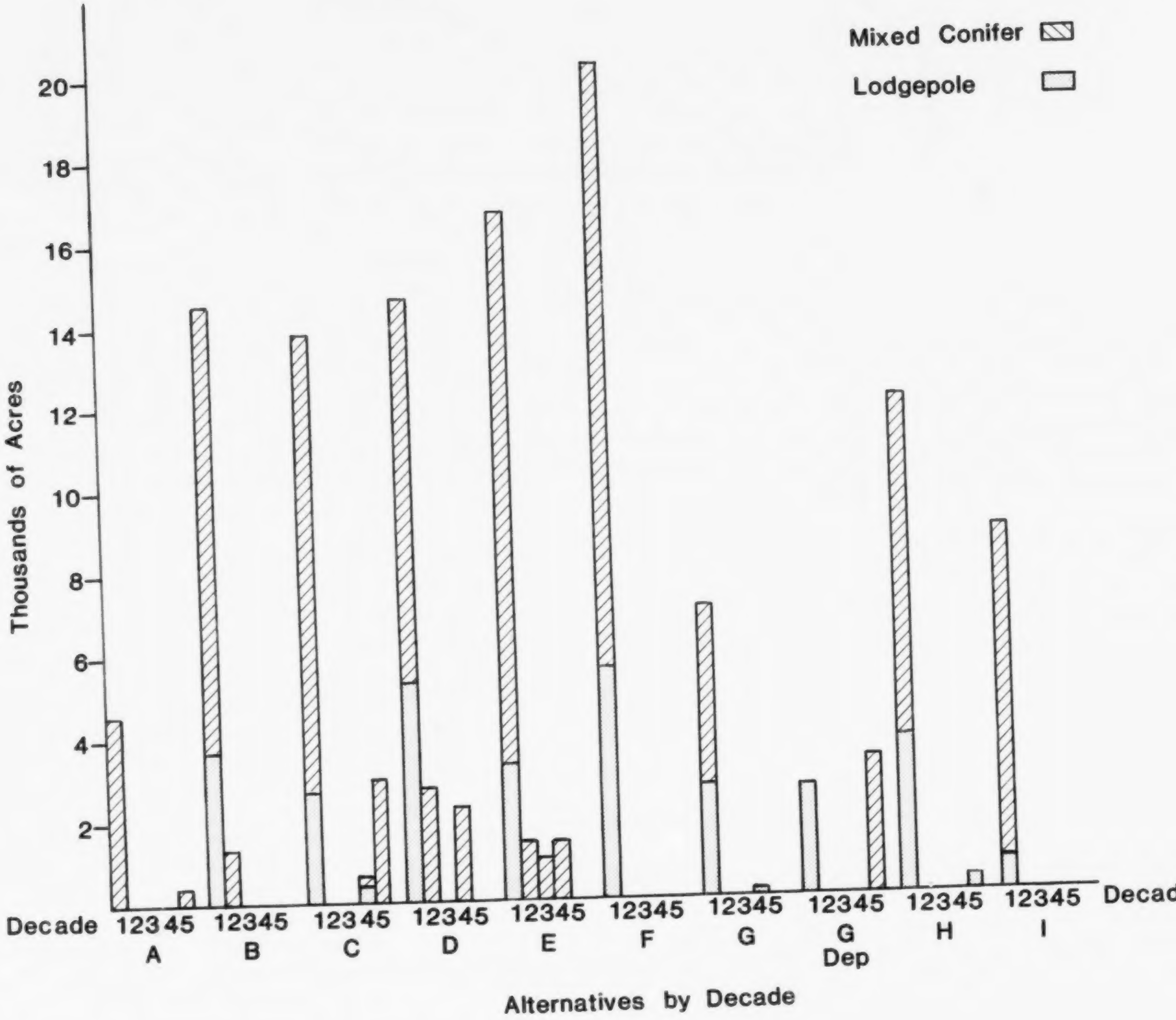
Commercial thinning would occur in incidental amounts during the next 50 to 70 years in all alternatives. Existing stands present few opportunities for commercial thinning because of existing insect and disease problems, and because of generally poor stand health. Since the late 1960's, approximately 54,000 acres have been precommercially thinned. Most stands were thinned too heavily to provide for future commercial thinning harvests.

Reforestation

Reforestation following logging would be by both natural seeding and by planting of nursery grown seedlings. Refer back to Figure II-1, Total Acres Regenerated Using Even-Aged Management During the Next 5 Decades. In all alternatives the number of acres regenerated would be greatest in the first decade. This is due to the large number of acres of non-stocked and poorly growing stands that would be treated (Figure IV-9 below). Existing stands that are not cut would continue to grow and accumulate volume. In future decades the number of acres that must be harvested to meet the timber harvest planned in each alternative would be somewhat smaller. Alternatives D and F would result in the largest number of acres regenerated during the next 10 years. Approximately 106,000 and 103,000 acres respectively would be regenerated by these alternatives. Alternative I followed by Alternatives C and E would regenerate the fewest number of acres.

During the coming decade Alternative I would regenerate 48,000 acres, while Alternatives C and E would regenerate 66,000 and 65,000 acres respectively.

FIGURE IV-9 Total Acres of Non-stocked and Poorly Growing Stands Regenerated During Each of the First Five Decades 1/



1/ Includes acres of natural regeneration following treatment of logging slash by timber sale operations, natural regeneration following site preparation, and reforestation by planting or by artificial seeding.

Growth and Inventory

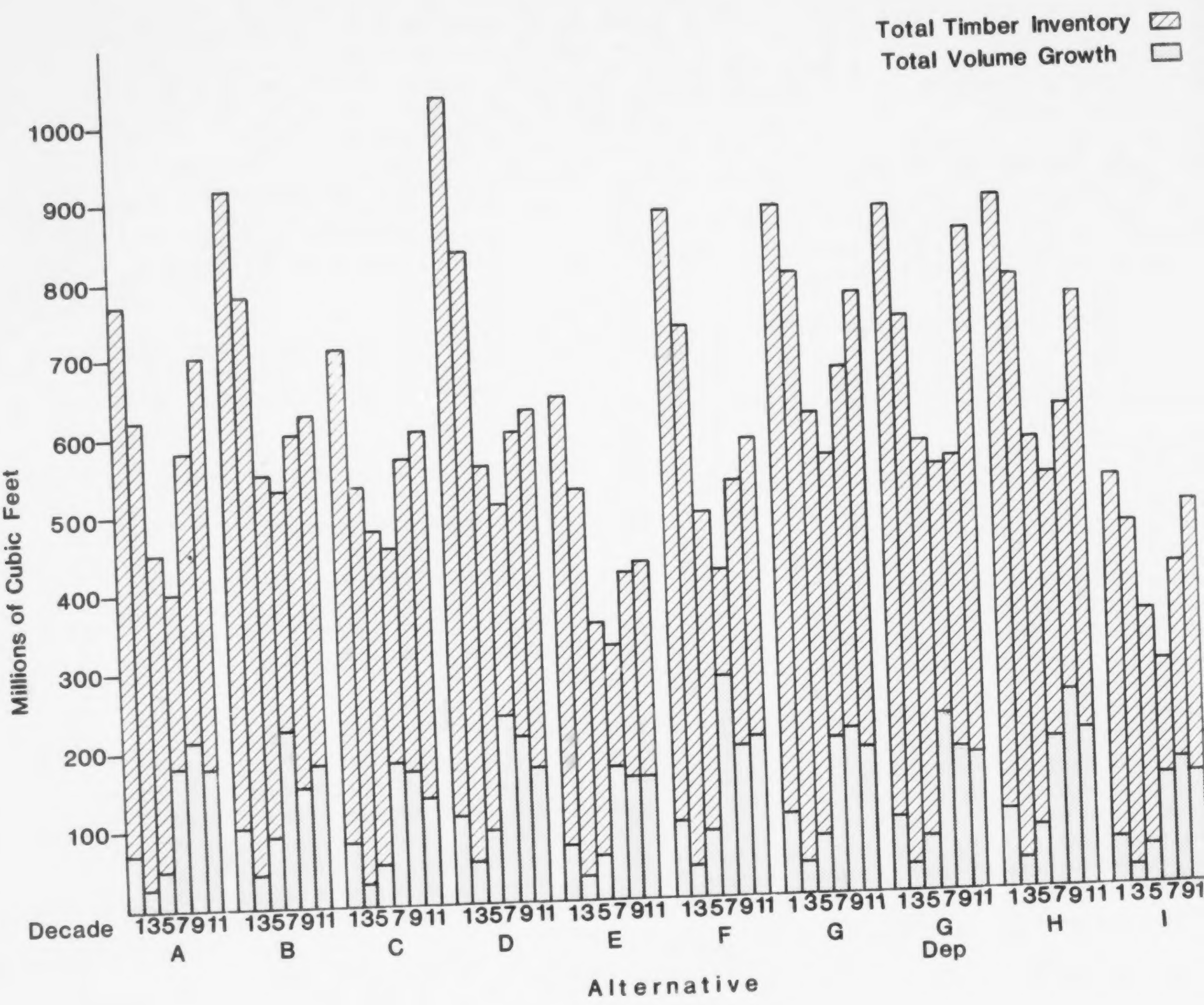
The total amount (inventory) of saleable timber on the National Forest varies by the number of acres of land available for timber management in each alternative. Figure IV-10 displays the inventory and growth of saleable timber for each alternative during the next 110 years. The volume of timber available for harvest would be universally highest during the next 10 to 30 years. The minimum growth rate as a percent of inventory would occur in about 30 years while the highest growth rate would occur in about 70 years when stands regenerated during the next few years were producing merchantable volume (growing) at the highest rate. Growth rates are somewhat underestimated for all alternatives because merchantable volume accumulated early in the rotation (prior to three decades before culmination of mean annual increment) was not reflected in FORPLAN timber yield coefficients.

Precommercial thinnings done in existing stands of seedlings/saplings during the next two decades were not modeled in FORPLAN. The effect of these thinnings will be to increase growth somewhat in 40 to 60 years above that estimated by the model.

Overstory removal cuttings done during the next decade in two story stands were not modeled in FORPLAN. Between 10% and 20% of timber harvesting in mixed conifer stands during the next ten years is likely to be by overstory removal cuttings. Overstory removal cutting is not appropriate in most lodgepole pine stands. Opportunities harvesting mature trees in existing two story stands to release young understory trees would decline following the first decade. The effect of these overstory removal harvests would be to increase growth somewhat in 20 to 50 years over that estimated by FORPLAN.

Opportunities for increasing growth in 2030 would be limited in all alternatives. The majority of volume growth in 2030 would accumulate on stands now existing, that would not yet have been harvested. Future precommercial thinnings in stands regenerated during the next decade would have very little affect on growth in 2030. Since the majority of harvesting during the coming decade in all alternatives would be to regenerate existing stands, departure from non-declining even-flow would not materially increase growth relative to long run sustained yield capacity in 2030.

FIGURE IV-10 Standing Timber Growth and its Relation to Growth on Inventory in Decades 1, 3, 4, 5, 6 and 11 for Each of the Alternatives



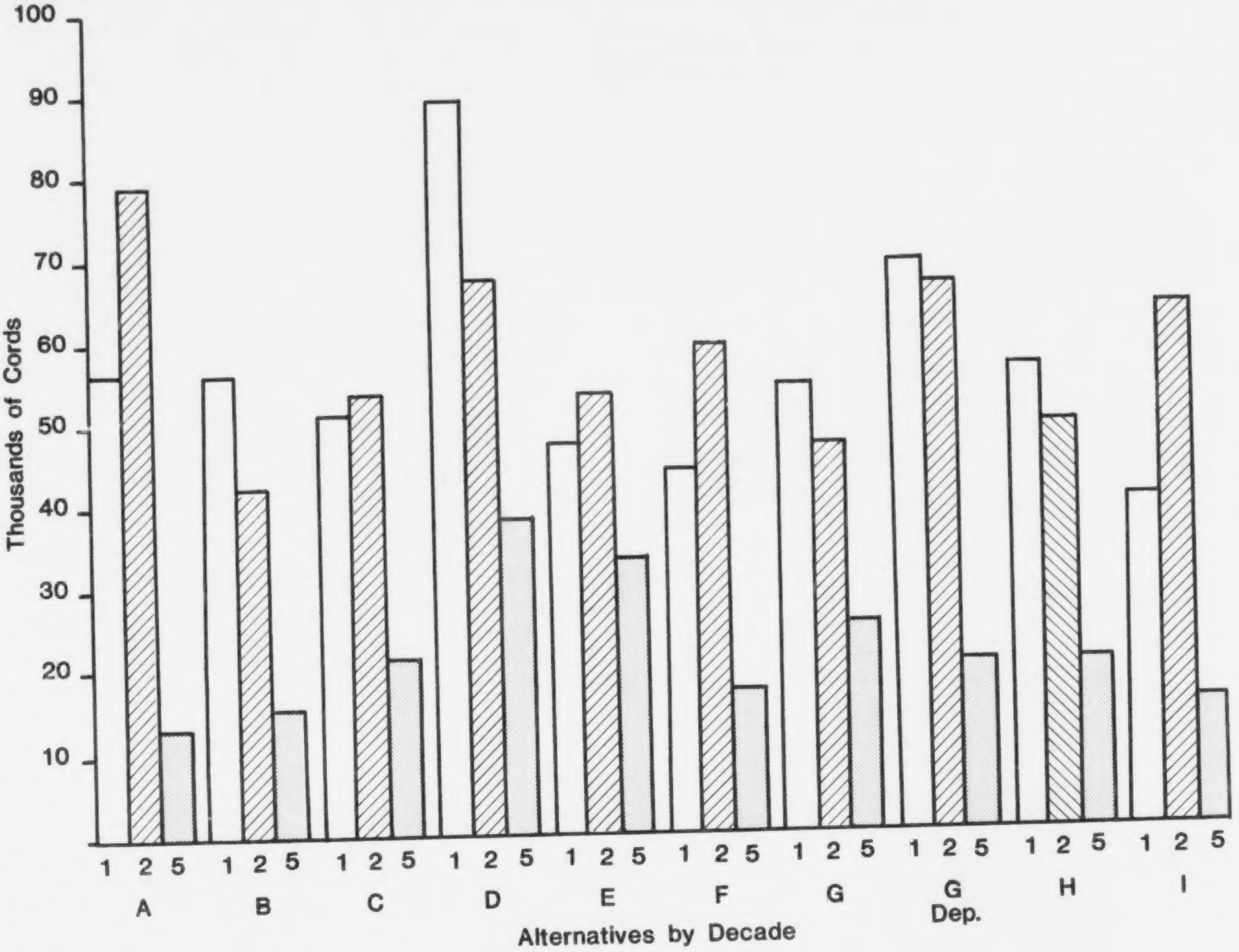
Alternatives that provide for the greatest amount of wildlife habitat or the highest scenic quality would retain the largest inventory of timber volume over time. Also, alternatives which emphasize amenities over the production of timber and other commodities would rebuild inventories of timber over time which would be comparable to the amount of timber available for harvest now. Alternatives A, C, G, G (departure), H and I demonstrate this. Volume growth as a percent of inventory would tend to be higher in Alternatives B, D and F and the commodity areas of Alternative E. These alternatives would emphasize production of timber and other commodities over amenities such as scenic values and wildlife habitat.

FIREWOOD

The supply and availability of firewood is affected by several factors. Based upon timber growth projections used in forest planning, smaller trees result from shorter rotations. In future decades the National Forest will sell smaller trees. Forest industry is increasing its use of chips and wood wastes. Increased use of smaller trees will tend to decrease the amount of fuelwood made available by harvest operations. Emphasis on scenic quality and wildlife habitat values may also decrease the amount of fuelwood available. This would decrease acres harvested annually and increase the amount of down and dead material retained in the forest. Increased roading associated with developing roadless areas, higher harvest levels, and roading associated with mining will improve access to fuelwood and make it more available to the public.

Alternative D followed by Alternatives G (Departure) and A would provide the largest amount of firewood gathering opportunities during the next 10 years (Figure IV-11). Fuelwood gathering opportunities would be greatest on gentle terrain. Very little firewood gathering would be likely to occur on moderate or steep slopes and in areas where road access is not developed.

FIGURE IV-11 Cords of Firewood Produced During Decades 1, 2 and 5 by Each Alternative



INSECTS, DISEASE AND ANIMAL DAMAGE

INSECTS AND DISEASE

The general health of forest stands would improve under all alternatives. The greatest improvement would occur in those alternatives which regenerate the largest number of acres and most intensively manage timber stands. The occurrence of forest insects and disease would be lowest in mixed conifer and lodgepole pine stands which are intensively managed for production of timber products. A higher level of insects and disease would occur in stands managed for scenic qualities or to provide wildlife habitat. The level of insects and disease would increase in low productive stands that are managed using selection cutting methods.

Alternatives A, C, H and I would have the largest acreage of mixed conifer stands managed under long rotations and with many canopy levels. The level of dwarf mistletoe, and the volume losses to defoliating insects would be higher in these alternatives than in Alternatives D, B or E. Root rots and foliar diseases would probably occur more frequently and result in higher volume losses in alternatives which manage the largest number of acres under long rotations.

The risk of large lodgepole pine volume losses to mountain pine beetle would be greatest in Alternative A followed by Alternatives I and E. Lodgepole pine volume losses to this insect should be inversely related to the number of acres of mature stands which are regenerated and replaced with seedlings and saplings. See Figure II-1 in Chapter II. The lowest risk of volume losses in lodgepole pine would occur with Alternatives B and D.

Timber stands in Alternative D followed by Alternatives B and E would have the lowest overall incidence of insect and disease. Stands in Alternative I would have the greatest. Losses in Alternatives C and A would be somewhat less than I. Insect and disease losses in low productive stands would be lowest in Alternative I, while they would be the highest in Alternatives D and B.

ANIMAL DAMAGE

The incidence of animal caused damage to commercial tree species would be expected to increase under all alternatives over the level presently experienced on the forest. The majority of animal damage occurs in immature stands of seedlings, saplings and small poles. Forestwide, the extent of damage would probably be strongly related to the acreage of young trees in stands managed for production of timber products. Less animal damage would likely occur in lodgepole pine stands than in mixed conifer stands.

Refer back to Chapter II, Figure II-1 which shows the number of acres regenerated under each alternative during the next 50 years. Alternative D followed by Alternatives A and F would probably experience the greatest amount of animal damage. These alternatives would regenerate the most acres of mixed conifer stands where the greatest use of planting would occur. Alternative I followed by Alternatives C, G and G (Departure) would experience the lowest amount of animal damage.

Range

RANGE

Environmental consequences of the alternatives on the range resource are both direct and indirect. Changes in the National Forest's grazing capacity are attributable to structural (water development, corrals, fences, etc.) and non-structural (revegetation, broadcast burns, water spreading, etc.) range improvements (direct) and to method and rates of timber harvest (indirect).

Owners and permittees of the livestock have problems with recreationists harrassing livestock or unintentionally bothering them. They find gates left open and livestock out on other people's land, or in some cases on highways endangering motorist lives. Permittees may experience livestock losses as a result.

Riparian areas are prime habitat for many species of wildlife and are also attractive locations for livestock to concentrate for lush forage, water and shade. In the late fall, livestock compete for forage with big game animals on winter range. Sometimes range management can enhance wildlife habitat. Such is the case with sheep grazing because sheep grazing generally maintains a high percentage of forbs that most big game species prefer.

Timber harvesting creates transitory range for domestic livestock. Forage values decrease as trees become re-established following regeneration cutting, and revert to pre-harvest levels in about 20 years. Timber practices that maintain open canopy conditions will prolong forage production. Forage species may be seeded following intermediate timber harvests and thinnings with minimal impact on tree growth.

Adequate water within livestock grazing allotments is vital to the management of allotments. Water, however, attracts livestock which is often undesirable for maintaining good water quality. Spring developments and pipelines are necessary to distribute water and to encourage forage use away from riparian water sources. Water rights are granted by the State of Washington in the name of the United States Government, and water developments are assigned to the permittee for maintenance.

Increases in permitted grazing use would depend on the rate of implementation of structural and non-structural improvements, completion of range allotment analyses, vegetative response to timber harvest and demonstrated demand and permittee cooperation.

In the long-term, increases in permitted grazing use would be based on individual range allotment analysis with term permits not exceeding the capacity of the lowest producing decades. Additional forage available in the higher producing decades could be utilized on a temporary basis using conditional permits tied to the availability of transitory range. Such conditional permits should provide for 10 to 15 years of reliable grazing.

Increases in permitted grazing would be made after the necessary structural improvements were constructed and would be gradual to allow permittees to make necessary changes in their base operations.

There would be need for increased coordination with timber for reforestation under those alternatives favoring timber harvest.

As stated in Chapter III, range forage utilization directly affects the range site microclimate. The degree of change varies by the animal unit months (AUMs) of use prescribed in the various alternatives. Increased AUMs reduces vegetative ground cover which in turn increases soil temperature. This stresses and consequently reduces desirable forage species. These species then have more difficulty re-establishing in the resulting harsh environment leaving room for the more hardy noxious weeds.

TABLE IV-12 Forage Produced by Alternative in Year 2000 Displayed in Tons of Forage per Year 1/

Alternatives	Tons of Forage Production 2/
A	39,829
B (RPA)	41,337
C	36,736
D	48,543
E	37,739
F	40,174
G	39,473
G (Dep)	42,030
H	41,205
I	34,238

1/ This is based on an Animal Unit Month being one cow with a nursing calf, utilizing approximately 1030 pounds (dry weight) per month. (This is converted from the Society for Range Management Standard of a 1000 pound cow consuming approximately 26 pounds of dry matter per day).

2/ Existing production is 32,960 Tons. (Existing Use is 26,535 Tons - from 1984 Grazing Statistical Report. Horse use is not included.)

Table IV-12 shows that Alternative D would have a substantial increase in grazing capacity by the second decade. Alternative I would not provide forage to reach existing production, but all others would reach or exceed existing production by the second decade. Capacity would then decline gradually beginning in the third decade.

Transitory range increases would parallel the acres of timber harvest. Transitory range would increase in Alternatives B, D, F and G (Departure).

Altering the forest canopy through timber harvest creates increased understory vegetation of grasses and shrubs. The resulting vegetation is transitory and the period of transition depends on the treatment following the timber sale. Timber stand improvement work (precommercial thinning) can maintain an open canopy and understory vegetation can be maintained, but with less production.

Table IV-13 shows the amount of AUMs provided by each of the alternatives over time. High forage production is reflected in decade 2 of Alternative D when an estimated 150,000 acres would be logged. Alternative D, in fact, produces high forage yields throughout all decades and Alterntive I produces the least in all decades.

TABLE IV-13 Animal Unit Months Produced Under Each Alternative Over Time

	Thousands of AUMs Decades				
Alternative	1	2	3	4	5
A (current direction)	62.0	67.7	63.8	61.7	60.8
B (RPA)	66.6	71.2	66.7	67.0	65.4
C	59.8	64.1	58.5	58.1	55.9
D	75.9	82.5	75.3	74.6	74.6
E	61.5	65.3	57.9	58.7	58.8
F	63.3	68.9	65.1	65.1	62.8
G	64.2	69.1	64.5	62.7	61.2
G - Departure	65.2	70.9	64.5	62.3	61.0
H	67.7	72.9	70.0	69.4	64.8
I	57.4	60.8	53.9	54.4	51.7

NOXIOUS_WEEDS

Experience has shown that noxious weeds, and in particular knapweed species, will largely occupy some sites once an invasion occurs. These are generally the drier sites with little shade. Sites occupied by vigorous grasses reduce the invasion by noxious weeds.

Some sites with disturbed soils from logging and other activities that remove existing vegetation are susceptible to invasion by noxious weeds if other types of more desirable vegetation are not established quickly. Roads contribute most to the spread of noxious weeds. The lack of competing vegetation allows these generally hardy plants to invade.

Overgrazing or other forms of site disturbance that create bare soil provide a suitable seedbed for noxious weeds. Seed may be carried by animals either through attachment to the body or by ingestion and feces deposition, contributing to invasion and spread.

Most recreation sites have seedbeds from heavy foot and vehicle traffic that are susceptible to weed invasion. Many of the spiney and stringy noxious weeds invade recreation sites to the point that they are unsuitable for recreation use.

The knapweeds are suspected to have a detrimental effect on some tree species. This may result in reduced germination rates or reduced seedling growth in affected trees.

Potential for noxious weed invasion is expected to increase as acreage of disturbed soil increases. Alternative D would have the greatest acreage disturbed by logging in the second decade and Alternative I would have the lowest in the first decade. Alternatives A, F and G (departure) would also have high amounts of acreage disturbed.

Potential for impacts on other resources includes recreation sites, administrative sites and loss of forage for wildlife.

THREATENED, ENDANGERED AND SENSITIVE SPECIES

PLANTS

No federally or state listed threatened, endangered or candidate plants are known to occur on the Okanogan National Forest (Michaels 1985). In all alternatives, no significant direct, indirect or cumulative effects on sensitive plants (State and Forest Service listed) would be expected to occur. All project level activities would evaluate potential impacts to sensitive plants and avoid possible adverse effects.

ANIMALS

Habitat capability for the spotted owl, a sensitive species, would be impacted as described in the section on "WILDLIFE OF OLD GROWTH CONIFERS" (Table IV-17 and Figure IV-16). Habitat loss would occur outside of wilderness in Alternative A, and result in a loss of habitat capability for two pair in decades 1-4 and three pair in 5 decades. The habitat capability of spotted owls would be unaffected by the other alternatives because of implementation of minimum management requirements (MMRs). This is because designated spotted owl management areas (SOMAs) for MMRs are established to essentially protect the integrity of presently suitable habitat outside of wilderness.

In all alternatives, no significant direct, indirect or cumulative effects would occur to threatened or endangered animals (see biological evaluation in Appendix D). All activities would be directed at protecting or enhancing habitat according to the Endangered Species Act and recovery plans in coordination with the U.S. Wildlife Service and Washington State Department of Game.

RESEARCH_NATURAL_AREAS

Alternatives B, G, G (departure), H and I would propose placing an additional 4,400 acres into two Research Natural Areas, Tiffany and Maple Mountain. These alternatives would provide for increased research and educational opportunities through the protection of 13 ecological cells. The alternatives would maintain existing wildlife and watershed values within the two areas. Current recreation activities and livestock grazing use would continue in the Tiffany area and administrative withdrawal of 2,000 acres of tentatively suitable forest land from future timber management would occur. This would not substantially reduce potential long-term sustained timber yields of any of the alternatives.

Alternative C would place just the Maple Mountain proposed area in an RNA. Tiffany would remain roadless and accessible only by trail. Alternative E would not add either Maple Mountain or Tiffany proposed RNAs, but it would allocate the areas to semi-primitive recreation.

WILDLIFE AND FISH

The term "wildlife" includes all forms of animals including fish, amphibians, reptiles, birds and mammals throughout this section, unless otherwise qualified.

Natural events such as vegetative succession, fire, weather, insects and diseases combined with human-caused impacts, principally vegetative manipulation, access and fire control, are major factors interacting with wildlife and its habitat. Each, either singly or in combination with other factors, profoundly affects wildlife distribution and numbers.

INTRODUCTION

Vegetative Succession

On the Okanogan National Forest many vegetative types and successional stages are present. In mixed conifer types, old growth that provides wildlife habitat is limited and poorly distributed across the forest. Outside wilderness, past harvesting of the largest, most accessible timber has eliminated or reduced amounts to less than 5 percent of potential in many townships. In some cases, the next oldest successional stage, "mature," is also scarce. Younger successional stages of mixed conifer are not limiting and occur largely because of past timber management.

In lodgepole pine types, the reverse is true with older, even-aged lodgepole pine being predominant and younger successional stages lacking. Here, for example, snowshoe hares, which are the main food source of lynx, are dependent on younger successional stages. As the snowshoe hares decline, so does the lynx population. Lynx and snowshoe hare both need young successional stages of lodgepole pine, but lynx also requires forested cover for security.

Deciduous types are in relatively small amounts on the Okanogan National Forest. Aspen, for example, has been succeeded by conifers and is continuing to decline.

Fire

Fire has influenced each of the successional situations described above. Old growth habitat value is often reduced when fire occurs and consumes snags and down logs.

Lodgepole pine is found in vast even-aged stands where wildfire has occurred in the past. Because of the mature, contiguous condition of these stands, the stage is set for wildfire to occur over vast acreages and set succession back to the grass-forb stage. If this occurs, snowshoe hare would increase, but lynx would not increase until later when hiding cover became available in the form of young lodgepole pine.

Given natural fire occurrence without human influence (fire suppression), aspen stands would be more plentiful on the Okanogan National Forest.

Certain wildlife need woody debris of various sizes for cover, and logs in various stages of decay for insects as food. The amount remaining after timber management or occurring naturally affects these wildlife, but may, in excess amounts, create a fire hazard to these type of habitats and others such as snags, cover and old growth.

Weather

Weather affects wildlife populations significantly on the Okanogan National Forest. Winter weather can be unpredictably severe because of arctic cold fronts. Mammals and birds that must forage and move about during winter are susceptible to unavailability of food, severe cold (requiring extra energy expenditure), protracted periods of stress, or being trapped (due to sudden storms) in marginal winter ranges.

Severe spring weather can greatly reduce reproduction, especially with birds such as grouse.

Moisture and growing conditions during the summer are important to conditioning animals for survival during the following winter.

Insects and Diseases

Mountain pine beetle could devastate most of the lodgepole stands in the near future. Dwarf mistletoe is rampant in many of the conifer stands. Numerous root rots and heart rots are present and severely affect localized parts of the forest.

Timber Harvest

Timber management is the main influence on wildlife habitat and is the most effective human habitat management tool on the Okanogan National Forest. Timber management is the primary reason for reduction of old growth, snow intercept/thermal cover for deer and snag numbers. However, it is also the primary tool for creating such habitat in the future. Habitat values can be reduced quickly with timber management, but creating such habitat is slow and difficult. Timber management influences soil erosion and the rate of sediment flowing into rivers and streams. In turn, natural reproduction and survival of fish can change as a result of vegetative manipulation.

In lodgepole pine types, timber harvest can provide younger successional stages that would expand favorable vegetative conditions for the lynx, and the snowshoe hare on which it preys.

Firewood gathering generally follows timber harvest, which can greatly reduce snag numbers in many areas. Providing firewood for humans can directly conflict with providing snags and down logs for wildlife.

Aspen must be regenerated by mechanical means (i.e. clearcutting during dormant season) because of the lack of wildfire which would otherwise perpetuate aspen. Aspen provides vegetative diversity in a generally conifer dominated forest: (1) cover (hiding and thermal), (2) forage (aspen, browse and buds, plus many associated vegetative species), and

(3) wildlife trees (snags and live trees with cavities) which in total are used by many wildlife species.

Riparian habitats commonly contain merchantable volumes of commercial trees. However, past timber practices have generally excluded riparian areas.

Range

Livestock are attracted to riparian areas for forage, water and shade. Concentrated livestock can cause a decrease in riparian vegetation that is important to wildlife. Removal of vegetation can reduce the value of fish habitat.

Livestock grazing can compete with wildlife for forage. Cattle will browse bitterbrush and other shrubs important to deer at times when other plants are not as palatable, such as during the fall season.

Access

Disturbance caused by travel and presence of humans impacts wildlife on the Okanogan National Forest. Roads built for timber harvest and thinning encourage firewood gathering (which affects habitat), and higher harvest (legal and illegal) of lynx and other wildlife. Concentrations of hunters during fall in deer migration corridors can lead to overharvest and safety problems. Cross-country skiing and snowmobiling can be adverse to wintering deer during periods of deep snow and severe cold when animals are under stress (Freddy, Bronaugh and Fowler 1985). Wildlife are vulnerable to human access and disturbance during critical times of reproduction and rearing (fawning, lambing, kidding and nesting). Streamside areas have frequently been used for road locations in the past because topography permits easy construction. These riparian areas support the highest diversity and density of wildlife (Table III-15) and, accordingly, human access and disturbance can adversely affect many forms of wildlife. Fisheries can be depleted by heavy fishing pressure where road access exists.

Control of access by regulations, gates and other closures requires intense effort to be effective. On the Okanogan National Forest, access control is difficult because of topography (in places) and public attitudes. Gentle slopes make it easy for vehicles to go around barriers and barricades.

Fire Control

Fire control has caused aspen to be increasingly succeeded by conifers. Prescribed fire can be beneficial for stimulating deciduous trees, shrubs and grasses which provide cover and forage for wildlife. However, snags, logs and cover can easily be lost with the use of prescribed fire.

HABITAT IMPROVEMENTS

Wildlife habitat improvements are relatively small projects to improve important wildlife habitats through structural or non-structural means. Implementation of these projects provide beneficial effects to certain species, but are minor in scale compared to effects from timber, range and recreation management activities. The relative importance of these effects are measured in wildlife habitat equivalent acres.

Prescribed burning of vegetation to improve forage conditions on deer winter range, bighorn sheep or mountain goat habitats are examples. Others include regeneration of decadent hardwoods, release of suppressed hardwoods, development of water sources, fencing to protect vegetation and water, improvement of ponds and streambanks and installation of structures to benefit fish and other wildlife. Protection of important wildlife habitat is not measured in wildlife equivalent acres.

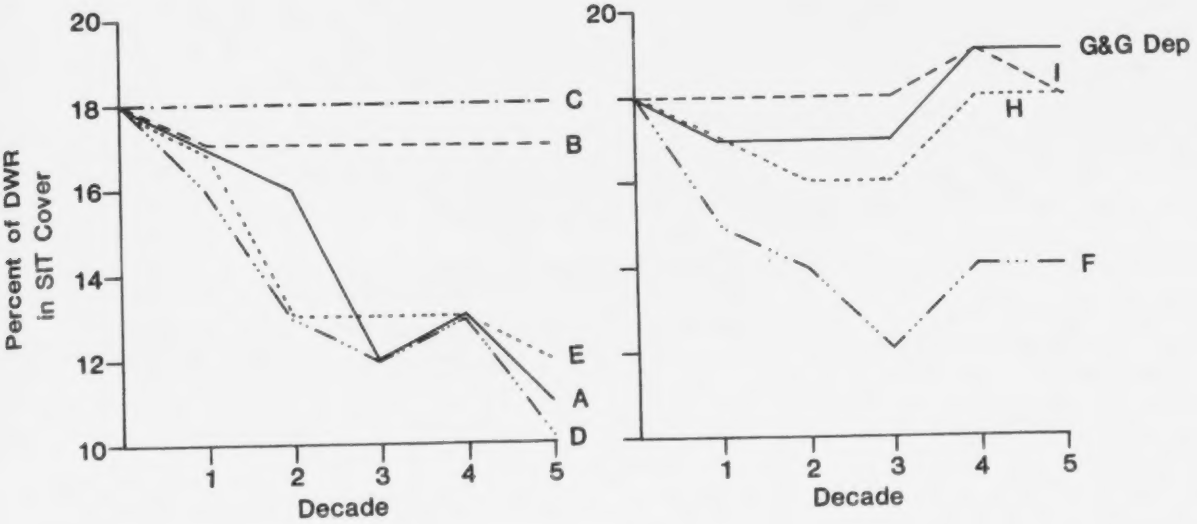
HABITAT AND INDICATOR SPECIES CHANGES

Habitat changes result from changing vegetation, access, microclimate, soil and water which are discussed previously in this chapter. Changes in the limiting habitats of wildlife indicator species are considered to be primary, direct effects which would cause indirect population changes. Effects based on remaining habitat, and capabilities for wildlife populations are summarized in the remainder of this section for Okanogan National Forest (ONF) indicator species and RPA species.

Mule Deer Winter Range (ONF RPA Indicator Species)

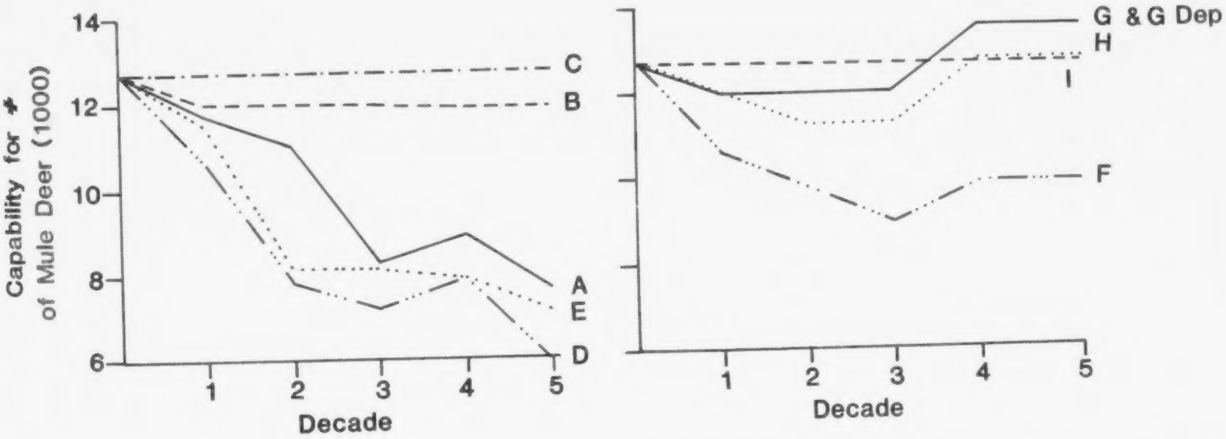
The most important and popular big game species in North Central Washington is the mule deer. To help meet the Washington Department of Game goals for mule deer, the National Forest must not only maintain current habitat values, but also increase values where they are lacking. This would help compensate for expected losses of deer winter range values on private lands due to orchard and housing development. Winter range quality is considered the primary limiting factor for the size of the deer herd (i.e. the number of animals that the winter range can support regulates the total number of deer on the National Forest in other seasons). Snow intercept/thermal cover (SIT) is considered the most crucial component of habitat on deer winter range. Therefore, change in this cover type is the most important factor in predicting how deer populations will respond to habitat changes. Changes in SIT cover result from vegetative changes described earlier under Diversity of Plant Communities in this chapter, under Timber Harvest in the above WILDLIFE AND FISH INTRODUCTION, and under the alternatives in Chapter II. The existing amount of deer winter range in snow intercept/thermal cover is 18 percent.

FIGURE IV-12 Comparison of Snow Intercept/Thermal (SIT) Cover on Deer Winter Range (DWR) by Alternative Over Time, Forestwide



Using SIT cover on deer winter range as the primary determining factor, tempered by accessibility and forage estimates, the capability of the winter range habitat to support deer is estimated in numbers of animals. Forage is estimated to be adequate in winter range in all alternatives, but open road densities change. The existing winter range habitat capability is estimated to be 12,700 mule deer.

FIGURE IV-13 Comparison of Winter Range Habitat Capability for Mule Deer by Alternative over Time, Forestwide



The alternatives that maintain or increase habitat capability over time (50 years) are C and I. Alternatives G and G (Departure) would drop 6% from the existing in the first decade, would maintain this level for three decades and then would increase 6% above existing levels in the fourth decade.

Alternative B would drop 6% in the first decade, with negligible further decline in 5 decades. Alternative H would also drop 6% in 10 years, would drop more in decades 2 and 3 (11%) and would regain status quo during decades 4 and 5 in relation to existing levels.

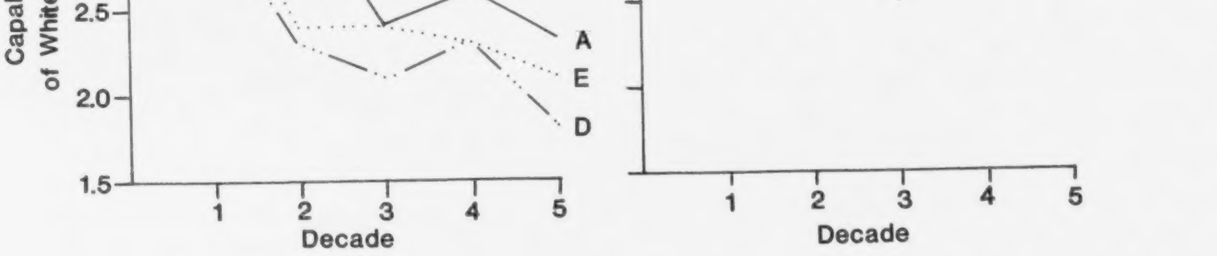
In Alternative A, habitat capability would decrease 7% in the first decade, but would continue toward large reductions (40%) in the fifth decade. Alternatives D, E and F would decrease 9%-17% in the first decade, and even further (23%-53%) during decades 2 through 5.

White-tailed Deer Winter Range (RPA Indicator Species)

The white-tailed deer population is increasing in size and importance on the Okanogan National Forest. White-tailed deer is an RPA management indicator species that, along with other selected wildlife species, is used to monitor changes of habitat capability on Forest Service lands nationwide. As with mule deer, winter range quality is considered the primary limiting factor for herd size of the white-tail, and snow intercept/thermal (SIT) cover is considered the most crucial habitat component on deer winter range.

Again using SIT cover, accessibility and forage estimates as determining habitat factors as described above for mule deer, the capability of the winter range habitat to support white-tailed deer is estimated in numbers of animals. The existing habitat capability is estimated to be 3800 white-tails.

FIGURE IV-14 Comparison of Winter Range Habitat Capability for White-tailed Deer by Alternative over Time, Forestwide



White-tailed deer habitat capability projections parallel those for mule deer because the determinates of change are identical.

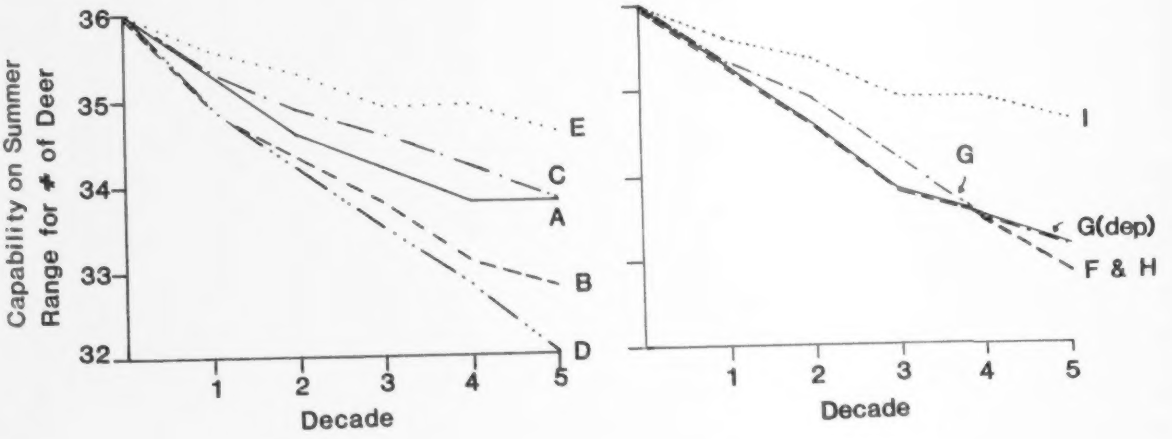
Effects to mule and white-tailed deer and habitat on National Forest are summarized above. In combination with other adjacent land ownerships and jurisdictions, the cumulative effects on total deer winter range would be an overall decrease of available area, SIT cover and habitat capability for mule and white-tailed deer. This is because the development and management on private land and other agency lands in general do not emphasize winter range habitat values. The Okanogan National Forest can not compensate for these losses with any alternative.

Mule Deer and White-tailed Deer Summer Range

The foregoing habitat capability discussion pertains only to deer winter range for mule and white-tailed deer. Because mule and white-tailed deer ratios can change, this discussion presents the total habitat capability for deer on summer ranges. The summer range capabilities are much larger than for winter range. As described in the AFFECTED ENVIRONMENT Chapter, recent estimates average 28,500 mule deer and 2,100 white-tails (30,600 total). The existing capability is estimated at 36,000 deer during summer. Higher numbers would likely result in higher winter range populations which would result in overuse and damage long-term forage capabilities on winter range. Therefore, in predicting summertime habitat capability, winter range is still the critical factor.

In all alternatives, summer range cover and forage for deer is estimated to be adequate, and would not change effectiveness of habitat capability. Effectiveness is expected to vary by density of open roads as described by Thomas (1979). Figure IV-15 shows changes of forestwide summer range habitat capability for deer that are expected to occur because of open roads.

FIGURE IV-15 Comparison of Habitat Capability for Deer on Summer Range by Alternative, Forestwide



Habitat capability for deer during summer would decrease from existing levels in all alternatives. Alternatives E and I would decrease the least, 1% in decade 1 and 4% in decade 5. Alternatives B and D would decrease the most, 3% in decade 1, and 9%-11% in decade 5.

In all alternatives and decades, reduced effectiveness on summer range is not considered important in limiting deer populations on the forest, because winter range capabilities would have to improve substantially both on and off-forest to allow herds to approach summer range capability. Cumulatively, the Okanogan National Forest with other adjacent ownerships and jurisdictions are not expected to significantly affect summer deer habitat, even though the trend is toward reduced effectiveness on National Forest (Figure IV-15) and expected to be similar on adjacent lands where logging and roading occurs.

Wildlife of Old Growth and Mature Conifers (ONF Indicator Species)

The spotted owl, barred owl, pileated woodpecker and marten are indicators for mixed conifer old growth and mature types. The marten also is an indicator for old growth and mature lodgepole type. The three-toed woodpecker is mainly associated with these older stages in the lodgepole (including subalpine fir) type, but also associated with the spruce dominated portion of the mixed conifer type.

Estimated existing old growth and mature habitat is as follows in thousands of acres:

TABLE IV-14 Estimated Existing Old Growth and Mature Habitat

	Old Growth/Mature Hab		Old Growth Hab	
	Mixed Conifer	Lodgepole	Mixed Conifer	Lodgepole
Outside Wilderness	356	147	49	95
Forestwide	511	243	204	190

TABLE IV-15 Comparison of Old Growth and Mature Habitat by Alternatives over Time Outside Wilderness

Old Growth and Mature Habitat (1000 acs)

Alternative	Mixed Conifer					Lodgepole				
decades -	1	2	3	4	5	1	2	3	4	5
A - Current Direction	294	237	194	173	137	147	148	150	152	155
B - RPA	307	281	253	217	192	126	104	99	80	60
C	319	286	264	235	216	134	127	124	122	114
D	286	243	204	162	116	124	102	97	77	58
E	313	278	255	220	191	143	136	137	129	126
F	296	265	233	195	168	126	108	102	86	72
G	316	288	248	227	198	128	115	110	104	95
G - Departure	302	268	240	222	194	128	115	109	104	98
H	316	287	239	209	181	124	107	101	92	84
I	323	295	271	246	236	142	142	142	143	140

Old Growth Habitat (1000 acs)

Alternative	Mixed Conifer					Lodgepole				
A - Current Direction	33	33	33	33	23	95	96	97	98	100
B - RPA	43	40	35	35	34	81	67	64	52	39
C	49	49	47	47	42	87	82	80	79	74
D	44	36	33	33	31	80	66	63	50	37
E	44	40	39	39	39	92	88	89	83	81
F	44	43	35	34	32	81	70	66	56	47
G	47	43	38	36	34	83	74	71	67	61
G - Departure	44	43	38	36	34	83	74	70	67	63
H	47	44	41	41	41	80	69	65	59	54
I	49	49	49	49	49	92	92	92	92	90

TABLE IV-16 Comparison of Old Growth and Mature Habitat by Alternatives over Time, Forestwide

Alternative		Old Growth and Mature Habitat (1000 acs)									
		Mixed Conifer					Lodgepole				
	decades -	1	2	3	4	5	1	2	3	4	5
A - Current Direction		449	392	349	328	292	243	244	246	248	251
B - RPA		462	436	408	372	347	222	200	195	176	156
C		474	441	419	390	371	230	223	220	218	210
D		441	398	359	317	271	220	198	193	173	154
E		468	433	410	375	346	239	232	233	225	222
F		451	420	388	350	323	222	204	198	182	168
G		471	443	403	382	353	224	211	206	200	191
G - Departure		457	423	395	377	349	224	211	205	200	194
H		471	442	394	364	336	220	203	197	188	180
I		478	450	426	401	391	238	238	238	239	236
		Old Growth Habitat (1000 acs)									
A - Current Direction		187	187	187	187	177	190	191	192	193	195
B - RPA		198	195	190	190	189	176	162	159	147	134
C		204	204	202	202	197	182	177	175	174	169
D		199	191	188	188	186	175	161	158	145	132
E		198	194	193	193	193	187	183	184	178	176
F		199	198	190	189	187	176	165	161	151	142
G		202	198	193	191	189	178	169	166	162	156
G - Departure		199	198	193	191	189	178	169	165	162	158
H		202	199	196	196	196	175	164	160	154	149
I		204	204	204	204	204	187	187	187	187	185

Using old growth and mature habitat as the primary determining factor, tempered by general snag levels, the capability of the habitat to support old growth/mature indicators is estimated in numbers of animals. Changes in old growth and mature conifer habitat result from vegetative changes described earlier under Diversity of Plant Communities in this chapter, under Timber Harvest in the above WILDLIFE AND FISH INTRODUCTION, and under the alternatives in Chapter II. The estimated existing habitat capability is presented in the following table (IV-16).

TABLE IV-17 Existing Old Growth/Mature Habitat Capability

Old Growth/Mature Wildlife Indicator	Outside Wilderness	Forestwide
Spotted Owl	17	55 pairs
Barred Owl	33	77 pairs
Pileated Woodpecker	1,020	1410 pairs
Marten	1,180	1770 pairs
3-toed Woodpecker	166	273 pairs

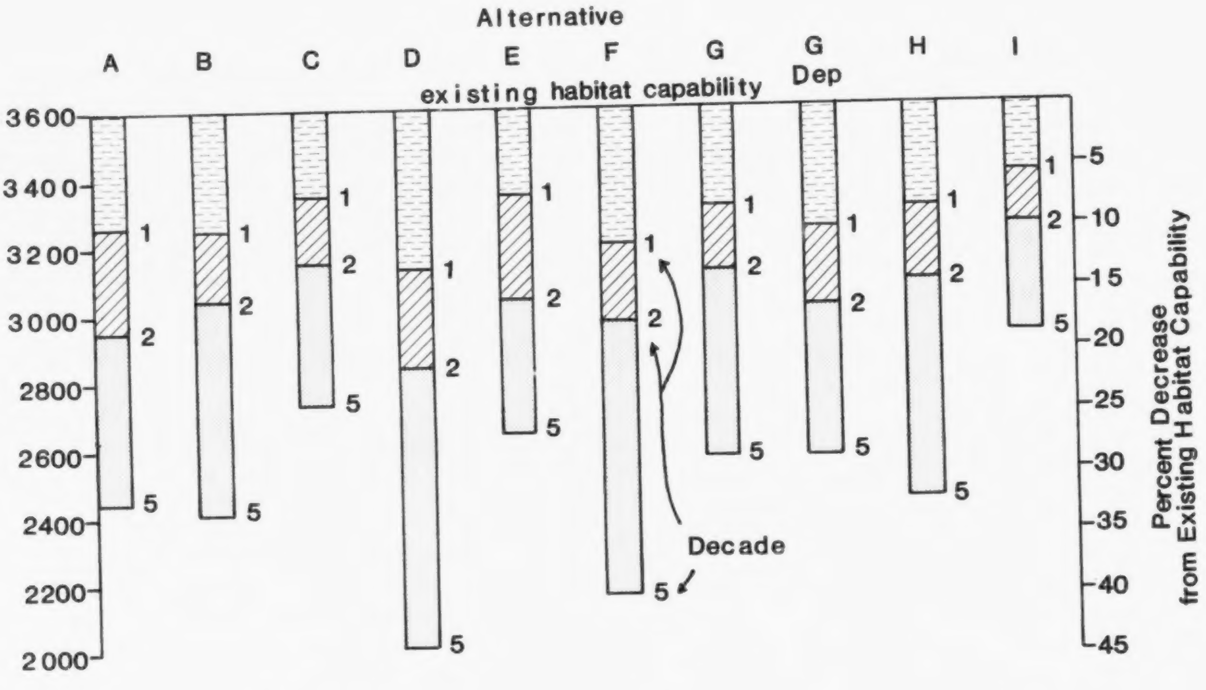
TABLE IV-18 Comparison of Habitat Capabililty for Old Growth/Mature Wildlife Indicator Species by Alternative over Time, Forestwide

	Capability for Numbers of Animals					
Alternative	1st	2nd	3rd	4th	5th	Decades
A - Current Direction						
spotted owl	53	53	53	53	52	pairs
barred owl	71	66	62	60	57	"
pileated WP	1240	1070	950	890	780	"
marten	1630	1490	1400	1350	1280	"
3-toed WP	273	275	277	279	282	"
B - RPA						
spotted owl	55	55	55	55	55	pairs
barred owl	72	70	67	64	63	"
pileated WP	1270	1200	1120	1010	940	"
marten	1610	1490	1420	1290	1180	"
3-toed WP	250	225	219	198	176	"
C						
spotted owl	55	55	55	55	55	pairs
barred owl	74	71	68	66	64	"
pileated WP	1310	1210	1150	1070	1010	"
marten	1650	1560	1500	1430	1370	"
3-toed WP	259	251	248	245	236	"
D						
spotted owl	55	55	55	55	55	pairs
barred owl	71	67	63	63	63	"
pileated WP	1210	1090	980	860	720	"
marten	1550	1400	1300	1150	1000	"
3-toed WP	248	223	217	195	193	"
E						
spotted owl	55	55	55	55	55	pairs
barred owl	73	70	68	64	63	"
pileated wp	1290	1190	1120	1020	940	"
marten	1660	1560	1510	1410	1340	"
3-toed wp	269	261	262	253	250	"
F						
spotted owl	55	55	55	55	55	pairs
barred owl	71	69	66	63	63	"
pileated WP	1240	1150	1060	950	870	"
marten	1580	1470	1380	1250	990	"
3-toed WP	250	230	223	205	189	"
G						
spotted owl	55	55	55	55	55	pairs
barred owl	73	71	67	65	63	"
pileated WP	1300	1220	1100	1040	960	"
marten	1630	1540	1430	1370	1280	"
3-toed WP	252	237	232	225	215	"
G - Departure						
spotted owl	55	55	55	55	55	pairs
barred owl	72	68	66	64	63	"
pileated WP	1260	1160	1080	1030	950	"
marten	1600	1490	1410	1360	1280	"
3-toed WP	252	237	231	225	217	"

Alternative		Capability for Numbers of Animals 1st	2nd	3rd	4th	5th	Decades
H							
	spotted owl	55	55	55	55	55	pairs
	barred owl	73	71	66	63	63	"
	pileated WP	1300	1220	1080	990	910	"
	marten	1620	1520	1390	1300	1210	"
	3-toed WP	248	228	222	212	203	"
I							
	spotted owl	55	55	55	55	55	pairs
	barred owl	74	71	69	67	66	"
	pileated WP	1320	1240	1170	1100	1070	"
	marten	1680	1620	1560	1500	1970	"
	3-toed WP	268	268	268	269	266	"

Habitat capability for all old growth/mature conifer indicator species would decrease from existing levels in all alternatives (see Figure IV-16). Alternative I would decrease the least, from 5% to 9% to 18% reductions in decades 1, 2 and 5, respectively. Alternative D would decrease the most, from 13% to 21% to 44% reductions in like decades.

FIGURE IV-16 Comparison of Habitat Capability for Old Growth and Mature Wildlife Indicator Species



Effects on old growth and mature conifer wildlife indicator species and habitat on National Forest are summarized above. In combination with other adjacent land ownerships or jurisdictions, the cumulative effects on total old growth and mature conifers will be an overall decrease of habitat value and capability for indicator wildlife. This is because of development and management on private land and other agency lands that in general do not emphasize old growth and mature habitat values. The Okanogan National Forest can not compensate for these losses with any alternative.

Primary Cavity Excavators (ONF and RPA Indicator Species)

A group of 10 woodpeckers occurs on-forest, including the pileated, 3-toed (both previously stated as old growth/mature indicators), black-backed, downy, hairy, Lewis' and white-headed woodpeckers, yellow-bellied and Williamson's sapsuckers, and common flicker.

Snags of adequate size and in adequate amounts are considered the key habitat component in determining population levels of primary cavity excavators. Changes in snag habitat result from vegetative changes described earlier under Diversity of Plant Communities in this chapter, under Timber Harvest in the above WILDLIFE AND FISH INTRODUCTION, and under the alternatives in Chapter II. The existing generalized snag situation is expressed in percent of maximum woodpecker populations (Thomas 1979) as follows:

Outside Wilderness	Inside Wilderness	Forestwide
50	80	60 percent

This index reflects both the overall snag habitat situation and generalized habitat capability for populations of woodpeckers.

TABLE IV-19 Comparison of Habitat Capability for Primary Cavity Excavators by Alternative, Outside Wilderness and Forestwide

	Percent of Maximum Potential Populations for Woodpeckers Outside Wilderness/Forestwide				
Alternative	1st	2nd	3rd	4th	5th Decades
A - Current Direction	49/60	47/59	46/58	45/58	44/57
B - RPA	50/60	49/60	49/60	49/60	48/60
C	50/60	51/62	51/62	51/62	51/62
D	48/60	47/59	46/58	44/57	43/57
E	49/60	48/60	47/59	45/58	44/57
F	50/60	49/60	49/60	49/60	48/60
G	50/60	50/60	50/60	50/60	50/60
G - Departure	50/60	50/60	50/60	50/60	50/60
H	51/62	51/62	52/62	53/63	54/64
I	50/60	50/60	50/60	51/62	51/62

Forestwide, all alternatives would change habitat capability for woodpecker populations small amounts throughout 5 decades. During the first decade, Alternative H would be the only one to change with a 3% increase from present. By the end of decade 5, the extreme variations of all alternatives would be 5% decrease (A, D and E) versus 7% increase (H). This stable situation is largely influenced by high snag levels (80%) in large areas of wilderness (626,220 acres) where snag levels are presumed to remain relatively constant over time in any alternative.

Outside wilderness, most alternatives (B, C, F, G, G-Departure and I) would maintain existing habitat capability for woodpecker populations during the first decade, and Alternative H would increases 2%. By the end of decade 5, the extreme variations would be 12%-14% decrease (A, D and E) versus 8% increase (H).

Effects to snag indicator species and habitat on National Forest are summarized above. In combination with other adjacent land ownerships or jurisdictions, the cumulative effects on total snags will be an overall decrease of habitat value and capability for indicator wildlife. This is because of development and management on private land and other agency lands that in general do not emphasize snag habitat values. Okanogan National Forest can not compensate for these losses with any alternative.

Anadromous Fish and Resident Trout (ONF RPA Indicator Species)

Natural fish production depends on many factors on-forest, including silt-free spawning grounds, proper temperatures, chemical content and flow of water. Sedimentation is a key factor most influenced by forest management activities (Williams 1981; Easterbrooks 1981). Sedimentation is induced by road building and timber harvest (see Soil Changes in PHYSICAL CONSEQUENCES section of this chapter), and directly affects fish habitat. The total existing rate of sedimentation is estimated to be 321 thousand tons per decade. Table IV-2 in the Water Quality Effects section compares sediment yield by alternative over time, forestwide.

The existing habitat capability is estimated to be 124,500 anadromous smolts and 290,000 trout (6") (Williams 1981-1985; Easterbrooks 1981).

Using sediment production as the primary determining factor, the relatively small changes indicate that forestwide habitat capability for fish would not substantially change from existing conditions with any alternative over time (Stowell and others 1983). Major changes could occur in small, localized areas, but the potential for this to be adverse to fisheries would be minimized in every alternative through the use of standards and guidelines which protect soil, water and fisheries.

Effects to fisheries are summarized above. In combination with other adjacent land ownerships and jurisdictions, the cumulative effects on total fisheries habitat and capability for fish is expected to produce o change. As stated previously in the AFFECTED ENVIRONMENT hapter, fuller utilization of the anadromous fish habitat apability may occur if downstream migration problems are lleviated.

ynx (ONF Indicator Species)

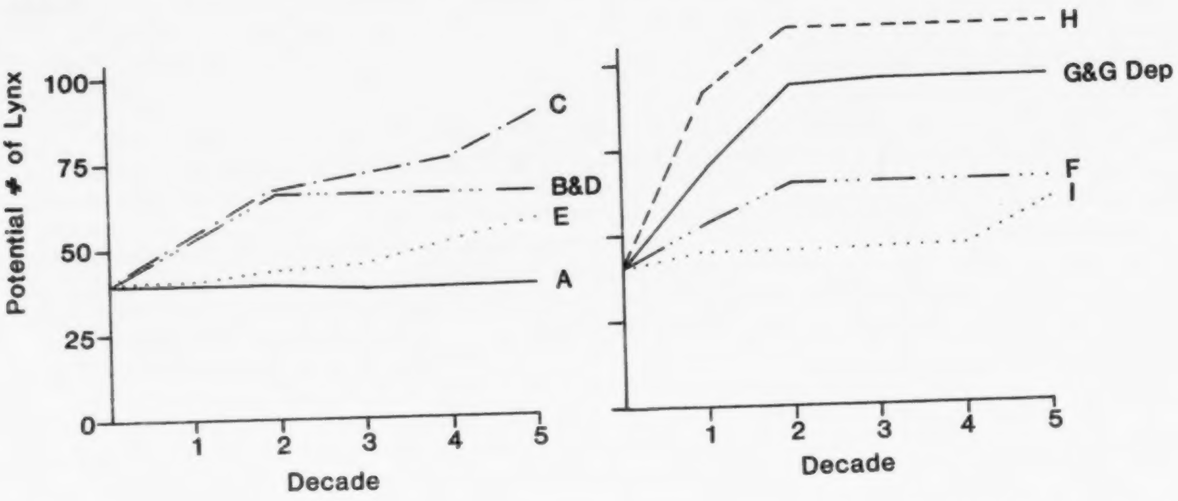
ynx are dependent on snowshoe hares for food and forest canopy for over. On the Okanogan National Forest, the lodgepole pine dominated xpanse known as the "Meadows Area" (see lynx area on Inventory Map in he map package) is the main area of lynx habitation. Sapling and pole tages are considered key to providing both cover and food for snowshoe hares (primary lynx prey), and accordingly the same for lynx. Changes in lynx habitat result from vegetative changes described earlier under Diversity of Plant Communities in this chapter, under Timber Harvest in the above WILDLIFE AND FISH INTRODUCTION, and under the alternatives in Chapter II. The existing condition of the lodgepole type is about 4% regeneration needed lands (few trees), 16% seedlings and saplings, 12% poles and 69% mature or old growth outside wilderness, and predominantly mature inside wilderness.

TABLE IV-20 Comparison of Percentages of Lodgepole in Seedling/Sapling and Pole Condition by Alternative over Time, Outside Wilderness

Alternative	Percent of Lodgepole Type in Seedlings, Saplings and Poles 1st	2nd	3rd	4th	5th	Decades
A - Current Direction	28%	27%	26%	25%	26%	
B - RPA	42%	56%	62%	74%	87%	
C	36%	41%	43%	45%	53%	
D	44%	59%	64%	77%	89%	
E	31%	36%	37%	41%	45%	
F	42%	54%	59%	69%	79%	
G	40%	49%	52%	56%	64%	
G - Departure	40%	49%	53%	56%	62%	
H	44%	54%	58%	64%	72%	
I	30%	30%	30%	30%	34%	

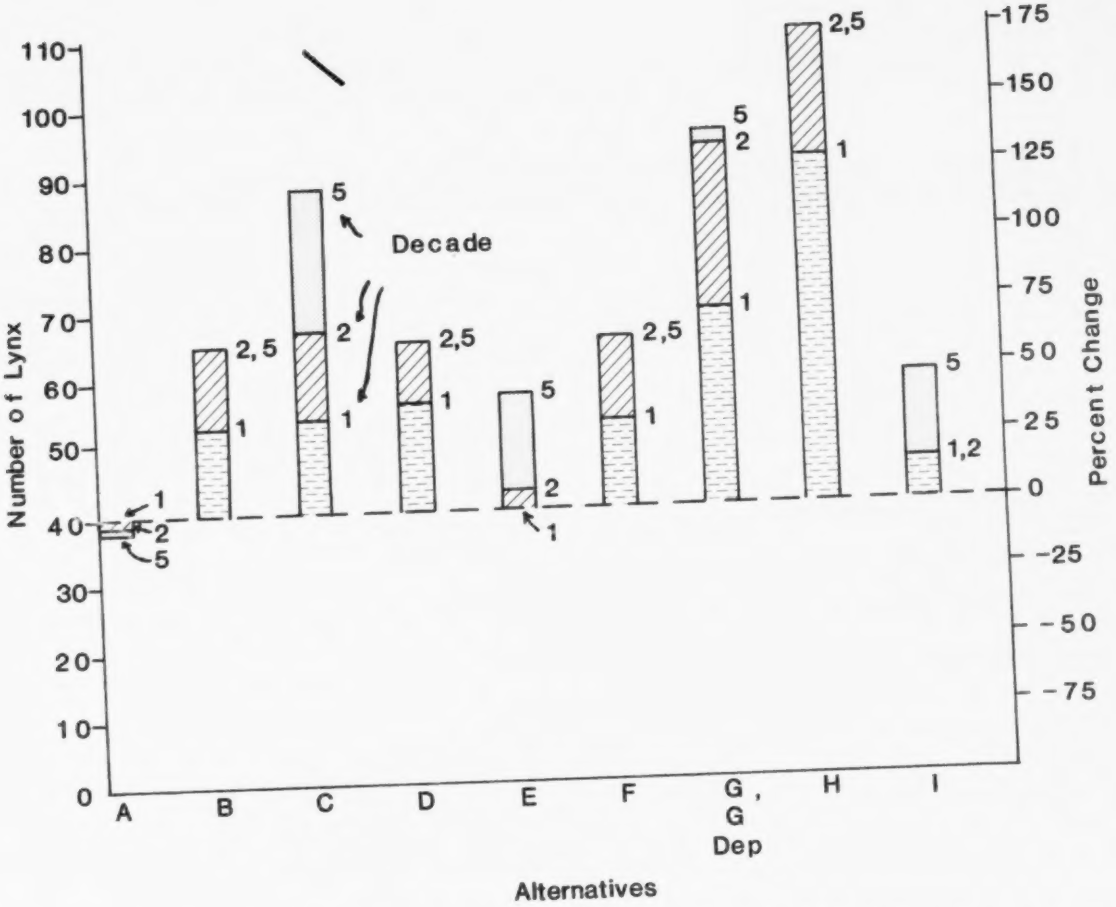
Using successional stages of lodgepole as the key determinant tempered by amount of roading and management emphasis toward wildlife, habitat capability for lynx is estimated in animal numbers. Present habitat capability is estimated to be 40 lynx forestwide.

FIGURE IV-17 Comparison of Habitat Capability for Lynx by Alternative over Time, Forestwide



All alternatives except A would increase the habitat capability for lynx beginning in decade 2. Alternative H would increases the greatest amount, 128% in decade 1 and 175% throughout decades 2-5. Alternative A would provide the least, with status quo in decade 1, 3% decrease in decade 2 and 5% reduction in decades 3-5 (Figure IV-18).

FIGURE III-18 Comparison of Habitat Capability for Lynx by Alternative in Decades 1, 2 and 5, Forestwide.



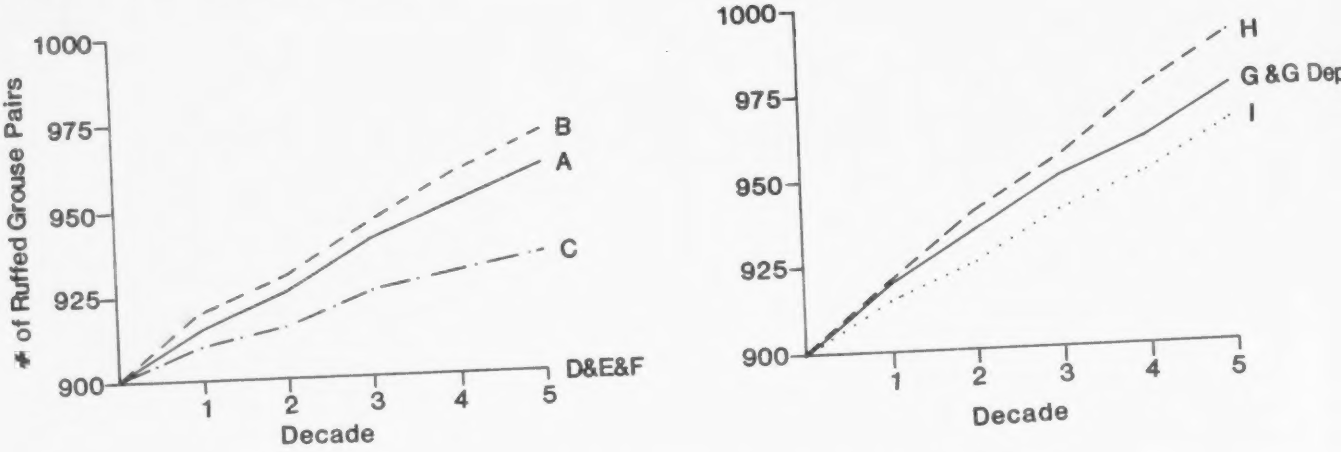
Effects to lynx and habitat on National Forest are summarized above. In combination with other adjacent land ownerships or jurisdictions, the cumulative effects on total lynx will be an overall increase of habitat value and capability for lynx. This is because of development and management on other agency lands that in general favors commodity management and would probably increase the younger, more productive stages for snowshoe hare and lynx.

Ruffed Grouse (ONF Indicator Species)

Ruffed grouse depend on hardwood trees during most of the year. Different successional stages for breeding cover, nesting cover, brood cover and winter feeding are important, and a balance of these within small areas is needed for optimal ruffed grouse populations (Gullion 1984).

Changes in ruffed grouse habitat result from vegetative changes described earlier under Diversity of Plant Communities in this chapter, under Timber Harvest in the above WILDLIFE AND FISH INTRODUCTION, and under the alternatives in Chapter II. Amount of regeneration cutting with emphasis toward wildlife which would affect ruffed grouse habitat was estimated and used as the determinant for habitat capability in animal numbers. Present habitat capability is estimated to be 900 ruffed grouse pairs.

FIGURE IV-19 Comparison of Habitat Capability for Ruffed Grouse by Alternative over Time, Forestwide



All alternatives would retain status quo or increase habitat capability. Increases would be slight (1%-2%) with alternatives which change (all except D, E and F) during the first decade. Increases in the second decade would be greatest (4%) with G, G-Departure and H. Alternative H would provide the greatest increase (10%) in decade 5.

Effects to ruffed grouse and habitat on National Forest are summarized above. In combination with other adjacent land ownerships or jurisdictions, the cumulative effects on total ruffed grouse will be negligible to habitat value and capability for ruffed grouse. This is because of development and management on private land and other agency lands that in general do not emphasize wildlife values. Unless emphasized, existing habitat and capability for ruffed grouse numbers are expected to remain relatively constant. Alternatives which increase habitat capability on the Okanogan National Forest are not expected to noticeably effect the total of all land ownerships, because National Forest changes are relatively small (Figure IV-19).

DIVERSITY OF ANIMAL COMMUNITIES

Changes in animal diversity are expected in terms of habitat capability for numbers of animals. Changes in numbers of species of wildlife would not be expected in any alternative. The capability of habitat to support numbers of wildlife indicators is presented earlier in this section, and Table IV-21 ranks each alternative as to how well habitat capability is provided.

TABLE IV-21 Comparison of Relative Rankings of Alternatives to Provide for Wildlife Habitat Capability (underlined = alternatives of same value)

Species/ Habitat	Best <=========================> Worst									
	1	2	3	4	5	6	7	8	9	10
Mule and White-tailed Deer/ Winter Range	I	C	G	G-D	B	H	A	E	F	D
Wildlife Indicator Species/ Old Growth and Mature Conifers	I	C	E	G	H	G-D	A	B	F	D
Woodpeckers/Snags	H	C	I	G	G-D	B	F	E	A	D
Lynx/Lodgepole	H	G	G-D	C	D	B	F	I	E	A
Ruffed Grouse/Hardwoods	H	G	G-D	B	I	A	C	D	E	F

Using Table IV-21 to summarize components of diversity which are expected to change, the following ranking of alternatives is an index of wildlife diversity for all Okanogan National Forest and RPA indicator species. Wildlife diversity is based on the ability to provide wildlife habitat capability (1 = best, 10 = worst) as follows:

Alternative Ratings:

H	C,G	I	G Dep	B	E	A	F	D
2.8	3.4	3.6	3.8	6.0	7.4	7.8	8.0	8.8

ECONOMIC CONSEQUENCES

The following section presents the economic consequences of the alternatives.

ECONOMIC_BASE_AND_UNEMPLOYMENT

The alternatives would have substantial, different effects on three primary local economies: timber, ranching and recreation.

Projections assume: 1) all National Forest timber offered for sale would be purchased and processed and 2) there would be no substitution for a reduced Okanogan Forest timber output. Therefore, projections are probably overstated, since when the demand is greater than the Forest Service supply, other landowners are expected to make up the difference.

As National Forest timber outputs increase, the opportunities for economic growth in local timber industries would be expected to increase. Alternatives B, D, F and G (departure) would provide for some level of economic growth. Only Alternative D would provide for large growth in the timber industry. Alternative A would maintain the existing timber economy, while Alternatives C, E, G, H and I would sustain only a reduced local timber industry. All alternatives, except Alternative A, would require some capital investments by the timber industry to process lodgepole pine. Realization of the economic growth opportunities would be dependent on these investments.

Public land use is usually less expensive than leasing or buying private land for grazing. For that reason, alternatives that offer greater opportunities for domestic grazing use of National Forest lands would help individual ranchers be more profitable. Alternatives B, D, F, G, G (departure) and H would offer increases over current uses in the first decade, while alternatives C, E and I offer less.

All alternatives would provide substantial economic benefits to the local recreation economy. Opportunities for increased economic growth in recreation related areas would be provided in all alternatives. All alternatives would provide the opportunity for development of the Early Winters Ski Area. Such development would have the potential for stimulating substantial economic growth within the area. Without the development of the ski area, more traditional industries such as lumbering, orchards, ranching and stores would remain.

The basis for these estimations of economic effects are comparisons of:

Present Net Value
Returns to Treasury
Payments to County
Jobs
Personal Income
Resource Outputs and Effects

See Chapter II for a detailed discussion and tabulations of these items.

Resource outputs and effects must be treated as economic effects to measure net public benefits because they influence all the other economic indicators so strongly. Many resource outputs and effects (e.g. visual quality) are benefits which simultaneously reduce present net value and increase public net benefits.

Expectations are that the larger the National Forest timber output, the greater the forest industry wages and employment, secondary employment in other economic sectors and total population increase. County unemployment rates would decrease with increased timber outputs (Table IV-22).

TABLE IV-22 Summary of Okanogan County Timber-related Projected Potential Socio-Economic Effects in 1985 1/

Alternative	Primary Employment	Secondary Employment	Unemployment Rates 2/	Wages Added 3/
	----number	of jobs----	percent	Million $
A (Current Direction)	460	113	11.9	8.0
B (RPA)	500	120	11.6	8.4
C	330	76	13.0	5.8
D	610	143	10.8	10.0
E	375	88	12.6	6.5
F	495	119	11.7	8.4
G	425	100	12.3	7.2
G (Departure)	520	125	11.4	8.8
H	445	105	12.1	7.6
I	265	62	13.5	4.6

1/ Hutchins (1981) is the source of the methods used to make these projections.

2/ The unemployment projections shown are averages based on historical records and do not agree with 1985 figures.

3/ Wages contributed to local economy by primary timber industry employment.

In Alternative D, forest industry employment and wages would be highest. Secondary employment, population and, to a lesser extent, county unemployment rates would also reflect these trends. Alternatives C, E and I would initially employ substantially fewer forest industry and secondary workers and provide lower total forest industry wages relative to existing levels.

The Government economy and other economies would not change much, but as secondary economies to timber would follow the general economic trends discussed above.

The Colville Confederated Tribes (CCT) would be economically affected because of competition for sources of timber. The Crown Zellerbach mill buys National Forest, State, private or Tribal timber. The Tribes also offer wood products from their own mill. Significantly lower timber offerings from National Forest land would tend to increase price. Economically, the effect on the CCT would be indeterminant. A large decrease in National Forest timber, Alternatives C, E, G and I, would decrease the number of local jobs. Therefore, the general economy (of which the CCT are a part) could be hurt. But also, substantially lower offerings from the National Forest would tend to increase demand for CCT timber and timber products.

REVENUES

Okanogan Forest revenues to the Treasury and County would vary by timber harvest level. The more timber harvested and processed, the greater the revenues generated. Alternatives B, F and G (departure) would generate more revenues than the existing situation. Alternative D would generate the most revenues and Alternative I, the least. Alternatives C, E, G and H would provide lower forest revenues relative to existing levels.

The local government organization size is related to timber harvest level and revenue generated. Those alternatives with lower timber harvest would mean smaller local governments.

COSTS

Costs are discussed in detail in Chapter II and Appendix B. Other costs, such as costs to the government and to the community, would not change significantly across the alternatives, but again, would follow the general trends discussed above.

BELOW_COST_TIMBER_SALES

It is the National Forest's experience that managing forested lands to produce multiple outputs often results in much higher timber management costs. The attendant benefit to increased cost is improved wildlife habitat, attractive scenery for forest visitors, higher water quality and greater amounts of forage produced to feed grazing cattle and sheep. Harvest unit size, proximity to roads, ability to manipulate competing vegetation, and constraints on the time of year when logging may occur strongly influence the cost of doing business. Harvest unit sizes may be reduced in riparian areas and in areas where scenic values are high to meet management objectives for the area. High wildlife values such as in deer winter range may mean a reduction in road access is desirable. The time of the year when logging or other timber management activities can occur may be constrained during periods of high recreation use, high soil moisture when soil damage might occur, and during periods critical to wildlife lifecycles such as fawning, nesting and winter survival.

All alternatives were developed to emphasize cost effective attainment of resource objectives on a forest basis. In Alternative I, no timber sales would be offered where costs exceed revenues produced. In Alternatives D, E and F, timber sales may be offered where costs exceed revenues, however the marginal return for dollars spent will be maximized when possible. In Alternatives A, B and H, costs may exceed revenues when necessary to attain non-timber sale resource objectives. Costs would generally not exceed revenues in Alternatives C, G and G (Departure). Exceptions would be permitted where there are demonstrable benefits to other resources.

SOCIAL CONSEQUENCES

The following sections discuss the consequences of the alternatives on the social setting, including human resources, population dynamics, urban quality, and recreation and leisure opportunities.

HUMAN RESOURCES

All alternatives would provide ample opportunities for human resource programs. However, human resource programs on the Okanogan National Forest are affected by budgetary restrictions rather than resource management alternatives. Therefore, human resource programs would not be impacted in any of the alternatives.

Implementation of any of the alternatives would not have substantial adverse effects on minorities, women and civil rights, although Native Americans may feel affected.

The Colville Confederated Tribes' (CCT) hunting rights would not change in any alternative, as they are guaranteed by Treaty. Deer populations would change by alternatives however, thus affecting the hunting opportunity of Native Americans. The hunting and taking of wild game is an important social and cultural part of Native American lifestyle, as well as providing a source of food. Lower deer populations could result in decreased cooperation and trust with the Federal Government. In alternatives where only minimum management requirements for deer are provided (D, E and F), significant reductions (10 percent and 50 percent in decades 1 and 5, respectively) could occur in the future. Alternative A, having no minimum management requirements, could also cause similar reductions (8 percent and 40 percent) in the deer population. Reduced hunting opportunities in these alternatives would likely affect Indians and non-Indians.

Colville Confederated Tribal members sense conflicts with National Forest management because of the cultural differences. With a large Forest Service timber output, federal government employment is apt to increase, causing stress for some CCT members. Therefore, some members of the CCT may feel adversely affected by alternatives with higher than current timber harvest output; and conversely, may feel relieved or positively affected by alternatives with lower than current timber harvest levels.

POPULATION DYNAMICS

Social groups, social structure and quality of life are affected by a myriad of parameter which include National Forest resource outputs. Because of this complexity, effects on local social parameters are difficult to define and project into the future. It is apparent, however, that substantial variations in the timber volume offered for sale from the National Forest would affect local social parameters.

Past trends indicate that changes in social groups would occur irrespective of which alternative would be implemented. General short-term trends include future increases among "Newcomers" and "New Pioneers," probably leading to increased intergroup conflicts with "Old Timers" and "Pioneers," particularly concerning forest management practices. These latter groups would probably sense increasing isolation and losses in control.

In the long-term, "Newcomers" would become recognized as "Old Timers," but with more urban values. "New Pioneer" numbers would probably stabilize. Overall, more "traditional" rural values, such as hard physical labor and extended families, probably would be lost gradually. These changes would be mostly centered in the valley bottoms, near population centers such as Omak, Okanogan, Twisp and Winthrop.

Alternatives which would greatly increase timber volume offered for sale would likely accelerate and intensify many of the general trends. These alternatives would stimulate relatively large and rapid social changes, primarily in the short-term. Long-term changes would occur more evenly. Alternative D would stimulate relatively large and rapid cyclical social changes in the first five decades. Alternatives C and I would likely slow general future social changes in the long-term. Reductions in employment opportunities could cause significant out-migration from the area in the short-term.

URBAN QUALITY

None of the proposed alternatives would have any effects on urban quality.

RECREATION_AND_LEISURE

RECREATION

The type of recreation opportunities provided on the National Forest would be influenced by several factors. Appendix H explains the influencing factors.

The sizes and locations of the Pasayten and Lake Chelan-Sawtooth Wildernesses would influence the type of recreation opportunities provided on the National Forest because motorized use would not be permitted on trails or areas near the wildernesses.

Other resource activities would influence the type of recreation opportunities provided. The primary influences would come from timber and access management and to a lesser extent from wildlife, commercial livestock grazing, minerals and non-recreation structure management.

If primitive and semi-primitive recreation opportunities are desired, scheduled timber management activities and road access would not be appropriate. Timber management activities and road access would be required to provide roaded recreation opportunities.

Management activities which would increase opportunities to view or harvest wildlife would generally be beneficial to the recreation visitor. User restrictions or closures for wildlife purposes would influence where visitors go to participate in recreation activities or the quality of their experience.

Commercial livestock grazing operations and facilities to support these operations would continue to be authorized. On the Okanogan National Forest, the most common conflict between grazing and recreation use would be the presence of livestock near streams and lakes, on trails or in campsites. To some visitors, the presence of livestock would be part of the recreation experience. To others, livestock would detract from their experience.

Mineral exploration on the National Forest which would not require roads would generally be compatible with all recreation opportunities if conducted outside the main visitor use season. Mineral exploration would not be compatible with providing primitive and semi-primitive recreation opportunities if road access is required. If a full-scale mining development occurs, the recreation opportunity provided would usually change and/or users would be displaced.

Non-recreation structures (such as powerlines) would generally not be compatible with primitive and semi-primitive recreation opportunities. They would be compatible with roaded recreation opportunities depending on the location and design of structures.

The acreage of each type of recreation opportunity provided would directly vary between alternatives (Table IV-23).

TABLE IV-23 Recreation Opportunities by Alternative

Alternative	Primitive and Semi-primitive Non-motorized	Semi-primitive Motorized	Roaded Natural	Roaded Modify and Rural
	Recreation Opportunity			
	thousand acres			
Current Situation	999	74	403	230
A (Current Direction)	745	30	438	493
B (RPA)	760	34	97	815
C	918	74	245	469
D	626	0	163	917
E	1011	96	24	575
F	854	57	24	771
G	791	41	179	695
G (Departure)	791	41	179	695
H	690	0	24	992
I	1101	0	139	466

All alternatives would provide primitive recreation opportunities only in the Pasayten and Lake Chelan-Sawtooth Wildernesses.

All alternatives except E and I would reduce the amount of area on the National Forest available for semi-primitive non-motorized recreation opportunities. Cumulatively, the most reduction would occur with Alternative D which would completely eliminate these opportunities, followed by Alternatives H, A, B, G and G (Departure), F and C.

The distribution of semi-primitive non-motorized recreation opportunities would also vary by alternative (See Alternative Maps). Alternatives E and I would provide the best distribution across the National Forest, followed by Alternatives C, F, G and G (Departure), A, B, H and D.

All alternatives except E and C would reduce the amount of area on the National Forest available for semi-primitive motorized recreation opportunities. Cumulatively, the most reduction would occur with Alternatives D, H and I, which would completely eliminate these opportunities, followed by Alternatives A, B, G and G (Departure) and F.

The distribution of semi-primitive motorized recreation opportunities would not vary much between alternatives (See Alternative Maps). Where provided, these opportunities would generally be confined to the Foggy Dew-Eagle Creek and Upper Methow River areas.

All alternatives except A would reduce the amount of area on the National Forest available for roaded natural recreation opportunities. Cumulatively, the most reduction would occur with Alterna-tives E, F and H, which would provide these opportunities only within the North Cascades Scenic Highway, followed by Alternatives B, I, D, G and G (Departure) and C.

The distribution of roaded natural recreation opportunities would also vary by alternative (See Alternative Maps). Alternative C would provide the best distribution across the National Forest, followed by Alternatives A, G and G (Departure), I, B, D and (F, E and H).

Because of the amount of roading and vegetative manipulation which would occur, all alternatives except E, I and C would reduce the number of miles of trail outside wilderness. Cumulatively, the most reduction would occur with Alternative D, followed by Alternatives H, B, G and G (Departure), F and A. Alternatives E, I and C would require additional trails to provide access within areas managed for semi-primitive recreation opportunities.

Not all recreation activities would be compatible with each other. The most noticeable conflict on the National Forest would be between motorized and non-motorized activities (both summer and winter), and to a lesser extent between hikers and horse users. All alternatives except D, H and I would have the possibility of increasing conflicts between motorized and non-motorized users. Alternative E would increase possible conflicts the most, followed by C, F, G, G (Departure), B and A. Potential conflicts would be mitigated by working with the affected user groups. In some situations, separation of activities may be required, but would be used only as a last resort.

Although the number of developed recreation sites would not necessarily decrease under any alternative, the number of sites in a natural setting would vary between alternatives (Table IV-24). The differences relate to the amount of roading and vegetation manipulation which would occur on lands surrounding the sites.

Vegetation management would be necessary in developed sites to deal with disease problems in the forest overstory and trampled out understory vegetation. It would also provide a better recreation experience by improving public safety.

TABLE IV-24 Number of Developed Sites in a Natural Setting

Alternative	Number of Sites	Capacity Persons At One Time
Current Situation	74	4996
A (Current Direction)	70	4255
B (RPA)	47	3470
C	70	4255
D	43	3395
E	15	1130
F	8	875
G	65	3995
G (Departure)	65	3995
H	8	875
I	53	3450

All alternatives would maintain all developed sites along the North Cascades Scenic Highway in a natural setting.

Alternatives A, C, G and G (Departure) would maintain all current fee sites and most non-fee sites in a natural setting.

Alternative D would maintain all current fee sites in a natural setting, but greatly reduce the number of non-fee sites in a natural setting.

Alternative B would maintain most current fee sites in a natural setting, but greatly reduce the number of non-fee sites in a natural setting.

Alternatives E, F, H and I would greatly reduce the number of both fee and non-fee sites in a natural setting.

Ability to Meet Demand

The number of recreation visitor days provided in roaded and unroaded non-wilderness settings would vary indirectly by alternative (Chapter II). These differences relate to the amount and timing of providing road access to currently unroaded areas.

All alternatives would be capable of meeting roaded recreation demand outside developed sites for all time periods.

As unroaded areas are accessed by roads, the ability to meet unroaded non-wilderness recreation demand would decrease. All alternatives except E, I and C would be unable to meet unroaded non-wilderness demand by 2030.

The supply of developed recreation opportunities at existing sites and at the proposed Early Winters Alpine Winter Sports Site would be in excess of demand for all alternatives. The exception is for campgrounds, where projected demand would exceed the reasonable capacity of existing sites by approximately 2010. Construction of new campgrounds was not programmed during the planning process because projected demand figures may not be realized. However, if projected demand is realized, expansion of existing sites or construction of new sites would be programmed.

Winter Sports

The environmental consequences of developing a downhill skiing facility at Early Winters is discussed in the Final Environmental Impact Statement for the Early Winters Alpine Winter Sports Study. These consequences would only occur if actual development takes place. If development does not take place within the time frames stated, consequences would be deferred.

The upgrading of facilities at Loup Loup Ski Area would not result in major impacts to other resources because of the small area involved.

The future setting of the surrounding area as viewed from within the development boundaries of the proposed Early Winters facility would vary by alternative. Alternative C would retain the most surrounding area in a natural appearing or slightly altered setting, followed by Alternatives A, E, I, G and G (Departure), B, F, D and H.

The future setting of the surrounding area as viewed from within the development boundaries of the Loup Loup Ski Area would also vary by alternative. Alternative C would retain the most surrounding area in a natural appearing or slightly altered setting, followed by Alternatives A, G and G (Departure), D, B, I, H, E and F.

Timber management activities and new road access would increase the availability of areas for snowmobiling and cross-country skiing by creating more open timber stands and additional routes. Winter logging operations would impact snowmobile and cross-country ski programs by mixing logging trucks and snowmobiles or cross-country skiers on the same route, thus creating a sometimes unacceptable safety problem.

The impacts on the snowmobiling and cross-country skiing programs provided by the Okanogan Snowmobile Advisory Board, Methow Valley Ski Touring Association and the Okanogan Valley Nordic Ski Association would vary by alternative. Alternatives emphasizing scenic viewshed management would restrict the operating season for timber harvest activities during the snowmobiling and cross-country ski season and not confine snowmobiling and cross-country skiing to designated routes, except in areas of concentrated wildlife use.

Alternatives emphasizing timber or wildlife would not necessarily restrict the operating season for timber harvest activities and would restrict snowmobiling and cross-country skiing to designated routes in areas of concentrated wildlife use. Cumulatively, Alternative E would result in the most area with winter operating seasons and route restrictions on snowmobiling and cross-country skiing, followed by Alternatives F, D, B, H, I, G and G (Departure), A and C.

VISUAL RESOURCE

Visual resource management is a dynamic process. In the short-term, some management practices would reduce visual quality. Other management practices such as revegetation and road obliteration would mitigate impacts on the visual resource. Short-term reductions in visual quality levels would be mitigated by the Forestwide Standards and Guidelines. Impacts would generally be reduced within three years.

Other resource uses would influence the visual quality level provided. The primary influences would come from the type of recreation opportunity desired and the resulting timber management activities and access.

If primitive and semi-primitive recreation opportunities are desired, a natural appearing landscape would be required.

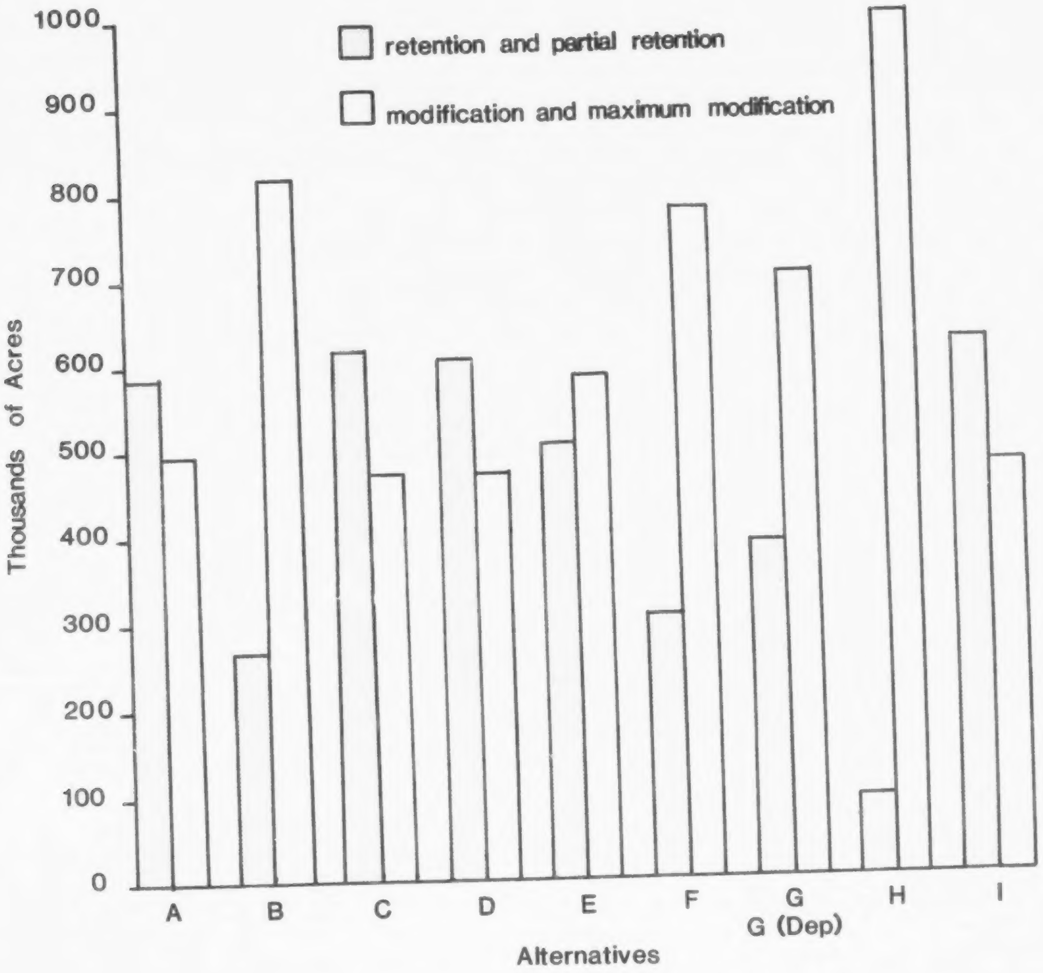
Timber management activities and road access which maintain retention and partial retention visual quality levels would provide roaded natural recreation opportunities.

Timber management activities and road access which result in modification or maximum modification visual quality levels would provide roaded modified or rural recreation opportunities.

Non-recreation structures would be compatible with retention and partial retention visual quality levels if properly located and designed.

The alternatives would provide various levels of visual quality in the long run (Figure IV-20). Alternatives emphasizing amenity values would provide the highest visual quality levels while those emphasizing commodity production would provide the lowest.

FIGURE IV- 20 Visual Quality Levels by Alternative 1/



1/ The same amount of acres are allocated to Preservation under each alternative, 626,200 acres.

All alternatives would maintain preservation visual quality levels on 626,200 acres in the Pasayten and Lake Chelan-Sawtooth Wildernesses.

All alternatives would maintain high (retention) visual quality levels in the North Cascades Scenic highway as required by the Washington State Wilderness Act of 1984.

All alternatives except I, C and A would reduce the amount of area on the National Forest where high and moderate (retention and partial retention) visual quality levels are maintained. Cumulatively, the most reduction would occur with Alternative H, which would maintain high visual quality levels only in the North Cascades Scenic Highway, followed by Alternatives H, D, B, F, G and G (Departure), and E.

Whether high or moderate visual quality levels are maintained in a roaded or unroaded setting would also vary by alternative. Alternative E would maintain the highest visual quality levels in an unroaded setting, followed by Alternatives I, C, G and G (Departure), B, A, H and D. In a roaded setting, Alternative A would maintain the highest visual quality levels, followed by Alternatives C, G and G (Departure), D, I, B and (E, F and H).

The visual condition of Sensitivity Level 1 and Sensitivity Level 2 Viewsheds (see Visual Resource Supply Potential - Chapter III) would change by alternative based on the amount of roading and vegetation manipulation which would occur. Alternatives emphasizing amenity values would retain the most acreage of viewsheds in a natural appearing (NA) or slightly altered (SA) condition, while alternatives emphasizing commodity production would convert the most acreage to a moderately altered (MA) or heavily altered (HA) condition. The future visual condition of these viewsheds is shown in Table IV-25.

TABLE IV-25 Future Viewshed Condition By Alternative 1/

	Alternative										
	EVC	A	B	C	D	E	F	G	G	H	I
	future condition										
Sensitivity 1 Viewsheds											
1 North Cascades Scenic Highway	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2 Winthrop/Lost River	SA	NA	NA	NA	SA	MA	MA	NA	NA	MA	NA
3 Twisp/Pateros	NA	NA	MA	SA	MA	MA	SA	SA	SA	MA	SA
4 Loup Loup Highway	SA	NA	NA	NA	SA	MA	SA	NA	NA	MA	NA
5 Highway 97	NA	NA	SA	SA	SA	SA	SA	SA	SA	MA	NA
6 Republic Highway	NA	NA	MA	NA	SA	MA	MA	MA	MA	MA	MA
7 Lost River/Slate Peak	NA	NA	NA	NA	SA	SA	SA	NA	NA	MA	NA
8 Chewuch	SA	NA	MA	NA	MA	MA	MA	NA	NA	MA	NA
9 8-mile	NA	NA	SA	NA	MA	MA	MA	NA	NA	MA	NA
10 Twisp River	SA	NA	NA	NA	SA	MA	MA	NA	NA	MA	NA
11 Bonaparte/Beaver/ Box Canyon/Myers	SA	NA	NA	NA	SA	MA	MA	NA	NA	MA	MA
12 Havillah Townsite	HA	SA	MA	NA	MA	MA	MA	SA	SA	MA	MA
13 Toats/Irongate/	SA	NA	MA	NA	MA	MA	MA	NA	NA	MA	NA
14 Alta Lake	SA	NA	MA	NA	MA	SA	SA	NA	NA	MA	NA
15 North Fork Salmon/ Fish Lake	SA	NA	NA	NA	SA	MA	MA	NA	NA	MA	MA
16 Buttermilk/Blackpine	MA	NA	NA	NA	SA	MA	MA	NA	NA	MA	MA
17 North Fork Beaver	NA	NA	NA	NA	SA	MA	MA	NA	NA	MA	MA
18 N. Fork Gold/Libby	SA	SA	MA	NA	MA	MA	SA	SA	SA	MA	MA
19 Loup Loup	MA	SA	NA	NA	SA	MA	MA	NA	NA	MA	NA
20 Foggy Dew	SA	SA	MA	NA	MA	MA	SA	SA	SA	MA	MA
21 Libby/Blackpine	SA	SA	MA	NA	MA	MA	SA	MA	MA	MA	MA

	Alternative										
	EVC	A	B	C	D	E	F	G	G	H	I
		future condition									
Sensitivity 2 Viewsheds											
1 Aeneas Valley	NA	SA	HA	SA	HA	HA	HA	MA	MA	MA	MA
2 Havillah County Road	MA	MA	HA	NA	HA	HA	HA	HA	HA	MA	MA
3 Toroda	NA	SA	HA	SA	HA	HA	HA	MA	MA	MA	MA
4 Dry Creek	SA	SA	HA	SA	HA	HA	HA	HA	HA	MA	MA
5 Harts Pass/Chancellor	NA	NA	NA	NA	SA	SA	SA	NA	NA	MA	NA
6 West Fork Salmon/ Chewuch	MA	SA	HA	NA	HA	HA	HA	SA	SA	MA	MA
7 30-mile Meadows	NA	SA	HA	NA	HA	HA	HA	MA	MA	MA	NA
8 Buck Pass	MA	SA	HA	NA	HA	HA	HA	HA	HA	MA	MA
9 Havillah/Myers	HA	NA	HA	NA	HA	HA	HA	HA	HA	MA	MA
10 Fox Peak/Cooper	NA	SA	HA	SA	HA	HA	HA	HA	HA	MA	MA
11 South Fork Gold	NA	MA	HA	SA	HA	HA	HA	HA	HA	MA	MA
Non-Viewshed Areas (% in natural appearing condition)	61	19	14	39	5	61	35	25	25	5	59

EVC = Existing Visual Condition
SA = Slightly Altered
HA = Heavily Altered
NA = Naturally Appearing
MA = Moderately Altered

1/ See Visual Significance and Viewshed maps for location of viewsheds.

All alternatives except C and A would reduce the amount of viewshed area in a natural appearing or slightly altered setting. Cumulatively, the most reduction would occur with Alternative H, followed by Alternatives E, F, B, D, I, G and G (Departure).

WILD, SCENIC AND RECREATION RIVERS

The potential classification of eligible river sections crossing National Forest land would vary by alternative based on the amount of roading and vegetation manipulation which would occur. Appendix G discusses classification criteria. Table IV-26 indicates the management areas that each river section falls into for each alternative. Semi-primitive and scenic viewshed management areas (4 and 5, respectively) would best retain the wild, scenic and recreational qualities of eligible rivers.

TABLE IV-26 Relationship Between Eligible River Sections Crossing National Forest Lands and Management Area by Alternative

River Section and Inventory Classification	A	B	C	D	E	F	G	G(Dep)	H	I
	management area									
Methow 1 - Wild	4	4	4	2	4	4	4	4	14	4
Methow 2 - Recreation	5	5	5	5	1	1	5	5	14	5
Chewuch 1 - Wild	15	15	15	15	15	15	15	15	15	15
Chewuch 2 - Recreation	5	1&5	4&5	2&5	4&1	1	5	5	12&13	5
Twisp 1 - Wild	15	15	15	15	15	15	15	15	15	15
Twisp 2 - Recreation	5	1&5	5	1&5	1	1&9	5	5	9&13	5
Lost 1 - Wild	15	15	15	15	15	15	15	15	15	15
Lost 2 - Wild	5	5	4&5	2	4&1	4&1	1	1	14	4&14
Lost 3 - Scenic	5	5	5	5	1	1	5	5	14	5
Pasayten - Wild	15	15	15	15	15	15	15	15	15	15
Wolf 1 - Wild	15	15	15	15	15	15	15	15	15	15
Wolf 2 - Recreation	5	1	4&5	2	4&1	9	14	14	9	5&14

Wild Classification

All alternatives would retain the potential wild classification of the Chewuch 1, Twisp 1, Lost 1, Pasayten and Wolf 1 river sections as they are located within the Pasayten or Lake Chelan-Sawtooth Wilderness.

All alternatives except D and H would retain the potential wild classification of the Methow 1 river section as the area would remain in an unroaded setting with no sheduled timber harvest. Alternatives D and H would change the potential classification to recreation as scheduled timber harvest would occur.

Alternatives C, E, F and I would retain the potential wild classification of the upper portion of the Lost 2 river section as the area would remain in an unroaded setting with no scheduled timber harvest. These alternatives would change the potential classification of the lower portion of the Lost 2 river section to recreation as scheduled timber harvest would occur. Alternatives A, B, D, G, G (Departure) and H would change the potential classification of the entire Lost 2 river section as scheduled timber harvest would occur.

Scenic Classification

All alternatives except E, F and H would retain the potential scenic classification of the Lost 3 river section as the area would remain in a natural setting with reduced scheduled timber harvest levels. Alternatives E, F and H would change the potential classification to recreation as the area would be in a more altered setting with increased scheduled timber harvest levels.

Recreation Classification

All alternatives would retain the potential recreation classification of the Methow 2, Chewuch 2, Twisp 2 and Wolf 2 river sections. Alternatives emphasizing amenity values would retain more area along these river sections in a natural setting with reduced scheduled timber harvest levels. Alternatives emphasizing commodity values would change the area along these river sections to a more altered setting with increased scheduled timber harvest levels.

HISTORICAL AND CULTURAL RESOURCES

Federal law requires the National Forest to identify cultural and historical resources and to evaluate these resources to determine if they are eligible (significant) for listing on the National Register of Historic Places. Identification and evaluation of cultural and historical resources would continue under all alternatives. Priority would be given to completing inventories and evaluations for those areas and sites where proposed undertakings would have the greatest potential to adversely impact eligible resources.

Federal law also requires the National Forest to negate or mitigate adverse impacts on eligible cultural and historical resources that would result from any proposed undertaking. Specific mitigation measures for eligible resources would be determined on a case-by-case basis.

Wherever land disturbing activities occurred, potential for adversely impacting previously unidentified cultural and historical resources would increase. Alternatives having greater amounts of vegetation manipulation and road construction and reconstruction would have a greater potential to adversely impact historical and cultural resources. However, these same alternatives would provide the greatest opportunity for locating previously unidentified resources. Cumulatively, Alternative D would have the greatest potential for adversely impacting while at the same time providing the greatest opportunity for locating previously unidentified resources, followed by Alternatives B, H, F, G and G (Departure), C, A, E and I.

The forestwide standards and guidelines would provide for the protection, maintenance and interpretation of cultural and historical resources. Long-term protection and maintenance needs of eligible cultural and historical resources would be based on evaluation results.

All alternatives would provide for consultation with the Colville Confederated Tribes regarding cultural resources of suspected prehistoric origin.

EFFECTS ON PRIME FARMLANDS, WETLANDS AND FLOODPLAINS

No prime farmlands are present on the Okanogan National Forest. Floodplains and wetlands on the forest would have only minor effects. Management activities in any wetlands and floodplains would be designed to prevent long and short-term adverse impacts, in accordance with Executive Orders 11988 and 11990 in all alternatives.

There would be no effects on prime farmlands, wetlands or floodplains off National Forest lands as a result of implementing any of the alternatives.

The consequences of taking precautions would be higher costs to move some activities out of floodplains or wetlands to higher ground. Timing of operations may be modified to prevent damage which could result in higher operating costs. Special practices that may include special equipment or cleanup requirements may impose higher operating costs also. Some opportunities for vegetation manipulation could be foregone to protect these sensitive lands. Table IV-2 in the Water Environmental Consequences sector of Chapter IV shows the riparian areas to be harvested to be 2%-4% of the 53,000 acres of riparian areas in any given decade on the Okanogan National Forest. The impacts would be nearly the same for all alternatives.

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Short-term uses are those that generally occur in less than 10 years on some part of the forest. Examples are livestock use of forage, timber management and wood harvesting, recreation and irrigation uses of the water resource.

Long-term refers to a period of more than 10 years. Productivity refers to the capability of the land to provide resource outputs such as forage, saleable wood and wildlife habitat. Soil and water are the primary factors of productivity and represent the relationship between short-term uses and long-term uses.

Each alternative was developed to assure that the minimum standards and guidelines from laws, regulations and Forest Service policy could be met. Long-term productivity of the forest ecosystems would be maintained in all alternatives.

The management prescriptions, management practices and effects of alternative implementation would be monitored to provide data for ensuring that these standards and guideline would be met. Details on the monitoring program are included in Chapter 5 of the Forest Plan. Monitoring requirements apply to all alternatives. One purpose of monitoring is to assure that long-term productivity of the forest would be maintained or improved when implementing the alternatives.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible commitment of resources refers to resources that are renewable only over a long period of time. Examples are old growth habitat, soil productivity or non-renewable resources such as cultural resources, minerals, areas of great scenic beauty and roadless area with wilderness potential.

All alternatives would make irreversible commitments of resources. Alternative A, followed by D, would make the greatest overall irreversible commitment of resources in terms of old growth habitat harvested. Alternative D would road the most acres within roadless areas. Alternative I would not harvest any acres of old growth, while Alternatives E and I would construct roads in the fewest roadless areas. Mineral extraction would be permitted in all alternatives. Accessibility to minerals would be highest in Alternative D followed by Alternatives G and G (Departure). Alternative C followed by Alternative I would have the lowest accessibility for mineral extraction. The amount of mining that occurs is likely to be strongly correlated to the amount of area accessible to mineral exploration and development under each alternative.

Irretrievable commitment of resources is the production or use of renewable resources that would be lost because of land management decisions that are made. In the science of economics it is referred to as the "opportunity cost" of a decision. This represents opportunities foregone while the resource cannot be used. Timber on steep slopes that is not economically accessible or in management allocations where timber management is not permitted may represent an irretrieveable commitment of resources since mortality is not salvageable and increased volume growth resulting from management is foregone. The commitment is irretrievable rather than irreversible because future technological advances or changes in land allocation may make timber management in these areas possible. Extraction of minerals is also an irretreivable commitment of resources. Extraction is dependent upon accessibility and other factors. All alternatives would make irretrievable commitments of resources.

The greatest irretrievable loss of timber volume (growth and mortality) occurs in Alternative I.

ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

The alternative formulation process considered a wide range of alternatives, some of which had potential for adverse environmental effects. Many of these effects were avoided by the criteria established for including alternatives that can be implemented. The ten alternatives considered in detail represent a broad range of resource ouputs, but also represent a reduction of adverse environmental effects. Some adverse effects that cannot be avoided are included in the alternatives. While these adverse effects are technically feasible to avoid, the cost involved would make total mitigation impractical. These effects include:

SCENIC VALUES

Timber harvesting, road construction and disposal of waste wood material would cause a temporary change in the landscape that is often distasteful to the observer. Wood debris on the ground, understory vegetation disturbance, dust, smoke and noise are normally experienced on an active project. These effects would be short-term.

FIRE MANAGEMENT

During the short-term period of logging and thinning operations there would be a temporary increase in fire hazard from waste material left on the ground in the form of unmerchantable trees, tops, limbs and needles. Long-term cumulative effects from timber harvest activities, which includes the use of prescribed fire, would increase vegetative diversity and reduce overall fire hazard by treating natural fuels.

RECREATION

Project activities such as timber sales and road construction would temporarily disrupt recreation uses by reducing or changing the type of recreation use that normally would occur on the area.

LIVESTOCK FORAGE

Timber harvesting and fuelwood cutting may have a short-term disruptive effect on proper livestock distribution and utilization of the forage resource. There may also be a short-term decrease in available forage because of disturbance by logging equipment and accumulations of slash.

TRANSPORTATION

Construction and reconstruction of roads would affect aesthetics, erosion, wildlife, noise levels and people using an area.

AIR QUALITY

The prescribed burning of timber sale activity slash would cause a temporary small change in air quality. This change would occur only during the actual burning. This change would be in the form of reduced visibility from smoke within and adjacent to the project area. Confinement fires in wilderness may also temporarily reduce viewing distances within these Mandatory Class I air quality areas.

WATER QUALITY

Sediment is the most important polluting material in National Forest streams. Project activities such as timber sales and road construction may contribute minor amounts of sediment to adjacent streams.

WILDLIFE

Increased human activities associated with recreation, livestock grazing and timber management would temporarily displace wildlife. Improved roads would have a long-term impacts on wildlife, and increased roading would decrease habitat effectiveness. Mixed conifer old growth/mature habitat would decline. Habitat capability of indicator species would decline.

TIMBER

Livestock grazing in newly reforested timber stands may result in damage to seedlings and reductions in growth. Seeding grasses or forbs to prevent erosion or to provide forage for domestic livestock, or for noxious weed control, or to improve wildlife habitat would reduce tree seedling growth and survival following planting or natural regeneration. It may also encourage increased animal-caused damage to tree seedlings by creating pocket gopher habitat, or by drawing grazing animals into tree plantations. Managing timber stands to provide range forage, wildlife habitat or scenic values would result in reduced yields and foregone opportunities for timber harvesting. Costs of timber management would be increased by management for wildlife habitat, protection of scenic values, consideration of recreation management objectives, protection of water quality and air quality, and by construction of roads that must serve a variety of forest users.

Mitigation measures are included in the management prescriptions in Chapter III of the Forest Plan. They are intended to mitigate the adverse effects that cannot be avoided.

UNCHANGED CONDITIONS

The following conditions remain unchanged for each alternative considered in this Environmental Impact Statement. Several issues (activities) are eliminated from further detailed study or are covered by previous environmental review (40 CFR 1501.7(a)(3) and, therefore, have no significant effects on the environment.

LOUP LOUP

The Loup Loup ski bowl operates under a special-use permit which will be reviewed on a periodic basis.

EARLY WINTERS

The Early Winters issue is addressed by a separate Environmental Impact Statement. The Record of Decision was signed by the Regional Forester on July 5, 1984, and authorized use on approximately 3,900 acres of National Forest land. Facilities would allow utilization by 8,200 skiers-at-one-time. The deceision is currently under administrative appeal.

HELICOPTER SKI PERMITS

Individual permits would continue to be issued on a project-by-project basis, but within direction of the Forest Plan.

MINING

The U.S. Mining Laws of 1872 provide for mining on Federal lands. The Forest Service cannot establish policy contrary to this legislation.

NORTH CASCADES SMOKEJUMPER BASE

The problem was resolved at the Regional, rather than forest level. The Regional Forester decided to retain the Base, with an expanded workforce.

USE OF HERBICIDES

This issue has been covered under an Environmental Impact Statement issued by the Regional Forester for Region Six of the USDA Forest Service. The Record of Decision for the FEIS adopts Alternative 2 which results in "full use of all methods of vegetation management, except chemical use would be reduced. Use of chemicals would be critically examined for effect on adjacent land, streams, water systems and nearness to communities." This Forest Plan does not deal with such site-specific data. Use of chemicals will be decided on a case-by-case, site-specific basis and any such decisions for use will be covered under a separate environmental analysis.

The Forest Service is currently under a Federal court injuction not to use herbicides until a "worst case analysis" is conducted; this analysis is currently being conducted.

WILDERNESS

Additional acreage would not be considered for wilderness designation during this planning cycle. The Washington State Wilderness Act of 1984 determined that with respect to National Forest System lands in the State of Washington reviewed during RARE II, "that review and evaluation or reference shall be deemed for the purposes of the initial land management plans to be adequate consideration of the suitability of such lands for inclusion in the National Wilderness Preservation System and the Department of Agriculture shall not be required to review the wilderness option prior to the revision of the plans."

LANDS

The forestwide standards and guidelines in the Forest Plan speak to land exchange priorities. These standards and guidelines apply to all alternatives equally. Alternatives do not vary in lands exchange proposals.

SOCIAL AND ECONOMIC

Changes in Housing, Land Uses and Regulations, and Community Services would not change by alternative.

POSSIBLE CONFLICTS BETWEEN THE PROPOSED ACTION AND OBJECTIVES OF OTHER AGENCIES

There are not any known conflicts between the proposed action and the objectives of Federal, Regional, State and local land use plans, policies and controls for the area concerned.

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CHAPTER V

LIST_OF_PREPARERS

The following is a list of the names, together with their qualifications (expertise, education, experience and professional disciplines), of the persons who were primarily responsible for preparing the Environmental Impact Statement and/or significant background papers.

INTERDISCIPLINARY_TEAM

TIM TOLLE Interdisciplinary Team Leader Hydrologist Ph.D. Geography	Ten years experience with the Forest Service as a hydrologist and land management planner. Three years experience as college instructor and hydrologist for the State of Oregon. Leader of the Interdisciplinary Team. Responsible for coordinating and directing team's efforts and preparation of Forest Plan documents.
MEL BENNETT Hydrologist B.S. Forest Mgmt. M.S. Forest Mgmt.	Fourteen years experience as soil scientist and hydrologist with Forest Service (Regions 1, 4 and 6). Adapted methods for water resource impact quantification. Provided water quality and water quantity interpretations.
BOB CROWELL Civil Engineering Technician	Thriteen years experience in transportation system planning, development and operations with the Forest Service. Provided transportation system technical information and roading costs. Interpreted FORPLAN output to develop estimates of roading by alterantive.
JAN FLATTEN Writer/Editor/ Cartographer B.A. Geography	Five years experience in writing/editing environmental documents, cartography and timber sale planning with the Forest Service. Three years experience with private industry in land use planning, cartography and writing/editing environmental documents. Editor for the EIS/Forest Plan and writer for transition and non-technical portions of the documents. Responsible for the compilation and drafting of maps for the EIS/Forest Plan.

RODNEY LENTZ Mining Geologist B.S. Geology M.S. Geology	Eight years experience in minerals and minerals management with the Forest Service and the USDI, Bureau of Land Management. One year experience in private sector. Provided and interpreted minerals resource data. Provided input to development of minerals portion of management strategies.
DENNIS LOWRY Wildlife Biologist B.S. Wildlife Biology M.S. Wildlife Biology	Ten years experience with Forest Service; three in timber management and seven in wildlife biology. Provided wildlife and fisheries inventory data. Developed wildlife management strategies with District specialists. Developed wildlife habitat modeling methodologies and coefficients. Coordinated with State game and fisheries. Provided wildlife and fisheries interpretations.
DON PRIDMORE Range Conservationist B.S. Wildlife Management	Thirty years experience with the Government including seven seasons and three years Army. Forest Service experience was in Montana, Idaho, Oregon and Washington. The past eighteen years have included range management. Other experience includes three years in wildlife and the remainder in timber, recreation, land uses and watershed. Fifteen years were as a district resource assistant. Provided input to formulation of range management strategies. Provided range resource inventory data. Developed FORPLAN range forage coefficients. Interpreted model outputs.
JEAN RODGERS Program Analyst B.S. Forest Management	Seven years experience in forest management with the Forest Service and the Bureau of Indian Affairs. Developed FORPLAN constraints to model alternative management strategies and interpreted economic model outputs. Provided social and economic resource data.
JIM RUSSELL Assitant Fire Staff B.S. Biol. Science M.S. Forest Fire Science	Fourteen years experience in timber management, fire management, forest residue reduction research and fire management planning with the Forest Service. Provided technical fire management and air quality information. Developed fire management direction and performed fire cost analysis.

HARRY SANFORD Operations Analyst	Twenty-three years experience with Forest Service, including transportation planning and construction and eleven years in land management planning. Formulated the FORPLAN model incorporated the physical and biological information. Developed FORPLAN goals and constraints to model alternative management strategies. Retired June, 1985.
JOHN TOWNSLEY Forest Silviculturist B.S. Forest Watershed Mgt. Certified Silviculturist, USFS Region Six	Nine years experience with the Forest Service, eight of which were in silviculture, timber sale planning, reforestation and timber stand improvement. Developed timber yield coefficients and timber economic coefficients. Provided technical information on timber management to other members of the interdisciplinary team. Developed timber management direction. Developed timber cost estimates used in Forest Planning.
DAVE YENKO Assistant Recreation Staff B.S. Forest Mgt.	Twenty years of Forest Service experience in recreation, special uses, timber management, range and fire management. Primary responsibility for providing and coordinating recreation, cultural, visual, wild and scenic rivers, roadless areas and wilderness inputs. Provided recreation inventory data and interpretations and developed recreation yield coefficients.

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CHAPTER VI

LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE REVIEWER'S GUIDE OR STATEMENT WERE SENT

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CHAPTER VII

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CHAPTER VIII

GLOSSARY

FOREST PLAN/EIS GLOSSARY

Abbreviations:

BD - Brush disposal

CCT - Colville Confederated Tribes

CEQ - Council on Environmental Quality

CFR - Code of Federal Regulations

CMAI - Culmination of mean annual increment

DWR - Deer winter range

EIS - Environmental Impact Statement

HCC - Clearcut harvest

HFR - Final (overstory) removal harvest

HPR - Partial removal harvest

HSH - Shelterwood harvest

HSL - Harvest leaving seed trees

HTH - Commercial thinning

IDT - Interdisciplinary planning team

IPM - Integrated pest management

LTSYC - Long-Term Sustained Yield Capacity

MBF - Thousand board feet of wood

MCF - Thousand cubic feet of wood

MMBF - Million board feet of wood

MMCF - Million cubic feet of wood

NCSH - North Cascades Scenic Highway

NEPA - National Environmental Policy Act

NFMA - National Forest Management Act

ONF - Okanogan National Forest

PCT - Precommercial thin

PNV - Present net value

RIM - Recreation Information Management

RPA - Forest and Rangeland Renewable Resources Planning Act

SCORP - State Comprehensive Outdoor Recreation Plan

SIT - Snow intercept and thermal cover

SMU - Stream Management Unit

SSC - Separate Suitability Component

TRI - Total Resource Inventory

TSI - Timber stand improvement

USDA - United States Department of Agriculture

USDI - United States Department of Interior

USLE - Universal soil loss equation

VQO - Visual quality objective

A

Accelerated Erosion. Any increase in the natural rate of an erosion process such as landsliding, stream channel scour, or dry ravel. Accelerated erosion can be caused by management activities that, 1) alter the natural erosion resisting forces (root strength, interpartical binding), 2) alter the flow of ground or surface water, or 3) change the natural slope locations of soil or rock materials.

Accept. A road management strategy with the objective to allow use but not to advertise or invite passage on a road that meets design and maintenance standards for full public use. The road currently meets design and maintenance standards for the stated use. Continued use is not encouraged and will be discouraged or eliminated if road conditions deteriorate or resource impacts develop.

Acre Equivalent. Used to adjust actual acres of habitat improvement or improvement structures to reflect overall habitat benefits derived. It reflects the zone of influence of the habitat improvement for the target species. For example, a single water development for upland game birds has an acre equivalent of 160, whereas a single water structure for big game has a value of 640 because it has a larger zone of influence for the more mobile big game animals.

Acre-foot. A water volume equal to the amount of water which would cover one acre one foot deep.

Activity. A measure, course of action, or treatment that is undertaken to directly or indirectly produce, enhance, or maintain forest and rangeland outputs or achieve administrative or environmental quality objectives. FSH 1309.11, The Management Information Handbook sets forth Forest Service activity definitions, codes, and units of measure.

Activity Fuels. Flammable fuels generated or altered by a resource management activity (see slash).

ADVENT. Outyear planning and budgeting data base.

Air Pollution. Undesirable human-caused addition to the atmosphere of substances (gases, liquids or solid particles) that are either foreign to the natural atmosphere or in quantities exceeding their natural concentration.

Air Quality Related Values (AQRV's). A feature or property of an area that is affected in some way by air pollution. Some identified values are: visibility, odor, flora, fauna, soil, water, climate, geologic feature, and cultural resources.

Airshed. A geographical area that, because of topography, meteorology and climate, shares the same air.

All-aged. A condition of a forest or stand that contains trees of all, or almost all, age classes.

Allocated funds. Monies distributed to other USDA agencies which receive assistance from the Forest Service. Examples of NFS programs include YCC, other human resource programs, O&C grants, and land and water conservation programs. State and Private Forestry examples are the Agriculture Conservation Program, the Forestry Incentives Program, and Rural Community Fire Protection.

Allowable Sale Quantity. The quantity of timber that may be sold from the area of available suitable land covered by the forest plan for a time period specified by the plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity." (36 CFR 219.3)

Alternative. One of several policies, plans or projects proposed for decision-making.

Ambient Air Quality Standard. Air pollutant concentrations of the surrounding outside environment which cannot legally be exceeded during fixed time intervals within specified geographic areas.

Amenity. An object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value is typically used in land use planning to describe those resource properties for which market values (or proxy values) are not or cannot be established.

Anadromous Fish. Those species of fish that mature in the sea and migrate into streams to spawn. Salmon and steelhead are examples.

Analysis Area. A delineated area of land subject to analysis of (1) responses to proposed management practices, rangeland outputs and environmental quality objectives, and (2) economic and social impacts.

Analysis of the Management Situation. A step required under the National Forest Management Act in which the forest determines its ability to supply goods and services to meet society's demands for them.

Animal Unit Months (AUMs). Amount of feed or forage required by one mature (1000 pound) cow or the equivalent for one month.

Appropriate Suppression Response. The planned strategy for suppression action (in terms of kind, amount and timing) on a wildfire which most efficiently meets Fire Management Direction (see Fire Management Direction) under current and expected burning conditions. The response may range from a strategy of prompt control (see Control) to one of containment (see Containment) or confinement (see Confinement).

Appropriated Funds. Monies authorized by an act of Congress which permit Federal agencies to incur obligations and to make payments out of the U.S. Treasury for specified purposes.

Arterial roads. These provide service to large land areas and usually connect with public highways or other forest arterial roads to form an integrated network of primary travel routes. The location and standard are often determined by a demand for maximum mobility and travel efficiency rather than specific resource-management service. They are usually developed and operated for long-term land and resource management purposes and constant service. (FSM 7700)

Available Lands. Forest lands that have not been withdrawn from timber production on a permanent basis by the Chief or higher authority. Withdrawn lands include Productive Reserved (RNAs, Wildernesses, Scenic Research Areas, Experimental Forests, and National Recreation Areas), and Productive Deferred (lands temporarily withdrawn for wilderness study, or possible additions to the Wilderness System). There are no productive deferred lands on the Okanogan National Forest.

B

Background. The visible terrain beyond the foreground and middleground where individual trees are not visible, but are blended into the total fabric of the stand. (See "Foreground" and "Middleground")

Base Sale Schedule. A timber sale schedule formulated on the basis that the quantity of timber planned for sale and harvest for any future decade is equal to or greater than the planned sale and harvest for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield capacity. This definition expresses the principle of nondeclining flow. (36 CFR 219.3)

Benchmark. Reference points that define the bounds within which feasible management alternatives can be developed. Benchmarks may be defined by resource output or economic measures.

Benefit (Value). Inclusive terms used to quantify the results of a proposed activity, project or program expressed in monetary of nonmonetary terms.

Big Game. Those species of large animals normally managed for sport hunting. On the Okanogan National Forest these include mule deer, white-tailed deer, mountain goats, bighorn sheep and black bear.

Biological Growth Potential. The average net growth attainable in a fully stocked natural forest stand. (36 CFR 219.3)

Biomass. The total quantity, at a given time, of living organisms of one or more species usually expressed in weight per unit area.

Board foot. A unit of measurement represented by a board one foot square and one inch thick.

Broadcast Burn. Allowing a prescribed fire to burn over a designated area within well-defined boundaries for reduction of fuel hazard or as a silvicultural treatment, or both.

C

Capability. The potential of an area of land to produce resources, supply goods and services, and allow resource uses under an assumed set of management practices and at given levels of management intensity. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils and geology, as well as the application of management practices, such as grazing, silviculture or protection from fire, insects and disease. (36 CFR 219.3)

Capital Investment. An input that increases the stock of natural or manmade resources (assets) needed to maintain or increase the flow of outputs in the future. Benefits resulting from capital investments are normally recouped in excess of 1 year.

Carrying Capacity. 1 (recreation): The amount of recreation use an area can sustain without deterioration of site quality; 2 (wildlife): The maximum number of animals an area can support during a given period of the year; 3 (range): The maximum stocking rate possible without damaging the vegetation or related resources. Carrying capacity may vary from year to year on the same area due to fluctuating forage production.

Cavity. The hollow excavated in trees by birds or other natural phenomena; used for roosting and reproduction by many birds and mammals.

CFL. Commercial Forest Land (see "Timber Land Classification").

Chargeable Volume. All volume included in the growth and yield projections for the selected management prescriptions used to arrive at the allowable sale quantity, based upon Regional utilization standards.

Class I, II or III. Designation given geographic areas of the country where air quality is better than the national standards. Allowable increases (increments) in pollutants are specified for each class. Class I allows the least increase; class III, the most. All National Forest System lands are class II areas except for the 88 wildernesses designated class I on August 7, 1977.

Clearcutting. The cutting method that describes the silvicultural system in which the old crop is cleared over a considerable area at one time. Regeneration then occurs from (a) natural seeding from adjacent stands, (b) seed contained in the slash or logging debris, (c) advance growth, or (d) planting or direct seeding. An even-aged stand usually results.

Climax. The culminating stage in plant succession for a given site where the vegetation has reached a highly stable condition.

Climax Species. Those species that dominate the stand in either numbers per unit area or biomass at climax.

Collector Roads. These serve smaller land areas and are usually connected to a forest arterial or public highway. They collect traffic from forest local roads or terminal facilities. The location and standard are influenced by both long-term multi-resource service needs, as well as travel efficiency. Forest collector roads may be operated for either constant or intermittent service, depending on land use and resource management objectives for the area served by the facility. (FSM 7700)

Commercial Forest Land (CFL). See "Timber Land Classification."

Commercial Thinning. A harvest in a forest stand less than rotation age designed to remove excess merchantable trees. The objective is to place the growth capability of the site on the remaining trees and to gain commercial value for the harvested trees.

Commodity. A transportable resource product with commercial value; all resource products that are articles of commerce.

Common Mineral. Materials such as sand, stone and gravel.

Concern. A point, matter, or questions raised by management that must be addressed in the planning process.

Confinement. To limit fire spread within a predetermined area principally by use of natural or preconstructed barriers or environmental conditions. Suppression action may be minimal and limited to surveillance under appropriate conditions.

Congressionally Classified and Designated Areas. Areas that require congressional enactment for their establishment, such as national wildernesses, national wild and scenic rivers, and national recreation areas.

Consumptive Use. Those uses of a resource that reduce its supply.

Containment. To surround a fire, and any spot fires therefrom, with control line as needed, which can reasonably be expected to check the fire's spread under prevailing and predicted conditions. The normal suppression tactic is indirect attack and burn to human-make or natural barriers with little or no mop-up.

Control. To complete the control line around a fire, any spot fires therefrom, and any interior islands to be saved; burn out any unburned area adjacent to the fire side of the control line; and cool down all hot spots that are immediate threats to the control line, until the line can reasonably be expected to hold under foreseeable conditions. The normal suppression tactic is direct attack, if possible, with total mop-up.

Core Area. (As related to the spotted owl). An area encompassing at least 300 contiguous acres of old growth suitable for nesting and reproduction. The area consists of a pair's territory (in part), the nest site, and principal roost areas.

Corridor. A linear strip of land identified for the present or future location of transportation or utility rights-of-way within its boundaries.

Cost, Capital Investment. The cost of manmade structures, facilities, or improvements in natural resources used as inputs in production processes to produce outputs over one or more planning periods.

Cost Efficiency. The usefulness of specified inputs (costs) to produce specified outputs (benefits). In measuring cost efficiency, some outputs including environmental, economic, or social impacts, are not assigned monetary values but are achieved at specified levels in the least cost manner. Cost efficiency is usually measured using present net value, although use of benefit-cost ratios and rates-of-return may be appropriate. (36 CFR 219.3)

Cost Plus Net Resource Value Change (C+NVC). Use in Fire Management Analysis as an economic efficiency indicator. Cost includes both the fixed annual cost for protection organization (annual fire program budget) and the variable suppression (emergency fire fighting) costs; NVC is the difference in the value of planned resource outputs on an area before and after a fire.

Cover. Vegetation used by wildlife for protection from predators, or to ameliorate conditions of weather, or in which to reproduce (Thomas 1979); fish cover may consist of deep water, undercut banks, submerged logs or overhanging vegetation.

Created Opening. Created openings are openings in the forest created by the silvicultural practices of shelterwood regeneration cutting at the final harvest, clearcutting, seed tree cutting, or group selection cutting.

Critical Window. A control point or area (such as a mountain pass) not to be designated within an existing utility corridor, but needed to retain future new utility corridor options.

Crop Tree. A tree that forms, or is selected to form, a component of the final crop, specifically, one selected to be carried through to maturity. Also known as a final crop tree or growing stock tree.

Culmination of Mean Annual Increment. The age at which the average annual growth is greatest for a stand of trees. Mean annual increment is expressed in cubic feet measure and is based upon expected growth according to the management intensities and utilization standards assumed in accordance with 36 CFR 219.16(a)(2)(i) and (ii). Culmination of mean annual increment (CMAI) includes regeneration harvest yields and any additional yields from planned intermediate harvests (FSH 2409.13).

Cultural Resources. The remains of sites, structures, or objects used by humans in the past--historical or archaeological.

D

d.b.h. Diameter at breast height. The diameter of a tree measured 4 feet 6 inches from the ground, usually on the uphill side of the tree.

Debris Slide. A shallow landslide of soil, rock, and organic material that occurs on steep slopes.

Debris Torrent. A large debris slide that is charged with water and confined to a steep stream channel.

Decision Criteria. Essentially the rules or standards used to evaluate alternatives. They are measurements of indicators that are designed to assist a decision-maker in identifying a preferred choice from an array of possible alternatives.

Decision Space. The range of possible answers open to the decision-maker based on capability and suitability.

Decision Variable. A component of an alternative in which activities and their costs, outputs, and benefits are identified and used for analysis and decision-making. All activities and costs necessary to accomplish the outputs and benefits are included.

Demand. The amount of an output that users are willing to take at a specified price, time period, and condition of sale.

Demand Analysis. A study of the factors affecting the schedule of demand for an output, including the price-quantity relationship if applicable.

Departure. A sale schedule that deviates from the principle of non-declining flow by exhibiting a planned decrease in the sale schedule at any time in the planning horizon. A departure is usually characterized by a temporary increase, usually in the beginning decade(s) of the planning horizon, over the base sale schedule originally established. (FSH 2409.13)

Designated Area (Air Quality). Those areas delineated in the Washington State Smoke Management Plans as principal population centers of air quality concern.

Desirable Residual Vegetation. The remaining vegetation after application of harvest cutting methods that meets management area objectives. The vegetation may be trees, shrubs, grasses, or a combination.

Developed Recreation. Recreation that requires facilities that, in turn, result in concentrated use of an area. Examples of recreation areas are campgrounds and ski areas; facilities in these areas are campgrounds and ski areas; facilities in these areas might include roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings.

Discount Rate. An interest rate that represents the cost or time value of money in determining present value of future costs and benefits.

Discounting. An adjustment, using a discount rate for the values of money over time so that costs and benefits occurring in the future are reduced to a common point in time, usually the present, for comparison.

Discourage. A road management strategy where passage appears feasible, but entrance information is designed to persuade some user groups or vehicle types not to use the road (advisory, warning signs and/or barriers).

Dispersion Evaluation Area. An area of land defined by topographic features, such as stream drainages, that are typically 2,000 to 5,000 acres in size, but do not exceed 10,000 acres.

Diversity. The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. (36 CFR 219.3)

Dry Productive Working Group. Available suitable forest lands that support or have supported stands of primarily ponderosa pine with Douglas-fir and minor amounts of western larch growing in association. Lodgepole pine may occur on some sites. Where fully stocked with natural, unmanaged stands, sites must be capable of producing a culmination of mean annual increment of at least 20 cubic feet per acre per year.

Dry Ravel. The slow to very rapid gravity driven movement of dry soil. Dry ravel usually occurs when the organic materials in the surface few inches of the soil are severely altered by fire. Dry ravel is most likely on slopes which are over 60% gradient.

E

Ecosystem. A complete, interacting system of organisms considered together with their environment; for example a marsh, a segment of stream, or a lake.

Effects. Environmental consequences as a result of a proposed action. Included are direct effects which are caused by the action and occur at the same time and place, and indirect effects which are caused by the action and are later in time or further removed in distance, but which are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Effects and impacts as used in this statement are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic quality, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions that may have both beneficial and detrimental effects, even if on balance the agency believes that the effects will be beneficial (40 CFR 1508.8).

Eliminate. A road management strategy where nonuse of a road is to be accomplished with barricade rather than regulatory.

Encourage. A road management strategy with the objective to influence certain user groups in specific types of vehicle to use this road. This is done by use of information techniques such as maps, contract designations or guide signing. The road is actively maintained and operated at the standard appropriate to the use experienced. The future maintenance level will usually be higher due to the increased use.

Endangered Species. Any species of animal or plant that is in danger of extinction throughout all or a significant portion of its range. Plant or animal species identified by the Secretary of the Interior as endangered in accordance with the 1973 Endangered Species Act.

Enhance. The altering of any natural feature or organism to improve its ability to maximize the production of a resource. Examples of this are: changes in the genetic makeup of commercial species of trees to increase growth; blasting of rock waterfalls that prevent migration of fish to upstream areas; and fertilization of soils.

Environmental Analysis. An analysis of alternative actions and their predictable short- and long-term environmental effects, incorporating the physical, biological, economic, social, and environmental design arts and their interactions.

Environmental Assessment. A concise public document required by the regulations implementing the National Environmental Policy Act.

Evaluation Plantation. A test in which the genetic constitution of an individual (or group of individuals) is evaluated from the performance of its progeny produced by some specific mating system.

Even-aged Management. The application of a combination of actions that results in the creation of stands in which trees of essentially the same age grow together. Managed even-aged forests are characterized by a distribution of sands of varying ages (and, therefore, tree sizes throughout the forest area). The difference in age between trees forming the main canopy level of a stand usually does not exceed 20 percent of the age of the stand at harvest rotation age. Regeneration in a particular stand is obtained during a short period at or near the time that a stand has reached the desired age or size for regeneration and is harested. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands. (36 CFR 219.3)

Existing Utility Corridor. A strip of land containing one or more existing linear utility rights-of-way, which is or will be designated in Forest planning in order to facilitate future authorization or additional utility rights-of-way.

Extensive Forest Management. A low investment level of management on regulated timberlands that requires initial harvest, regeneration, and final harvest. Some precommercial thinning may be done to prevent stagnation and disease buildup.

F

Fire Hazard. The measure of ease of ignition, fire spread potential, and fire suppression difficulty as influenced by the type, volume, size, distribution, condition, arrangement, and location of the fuel profile.

Fire Intensity Level (FIL). An expression of fire line intensity, based on typical flame length of a fire behavior condition, used in the analysis to reflect differences in difficulty of suppression and fire effects on resource outputs:

FIL	Flame Length (Feet)
1	0-2
2	2-4
3	4-8
4	8+

Fire Management Direction. Fire management standards, guidelines, and practices based upon land and resource management objectives. Fire management direction is used to define the kind, level, and timing of fire protection and use activities, including the appropriate suppression response, which efficiently meet management objectives for each management area.

Fire Management Program. The planned mix of activities, facilities, and forces that constitutes how the fire management budget will be allocated on the National Forest. Prevention, detection, fuels management, and suppression are included.

Floodplain. The lowland and relatively flat areas adjacent to streams and rivers subject to flooding. A 100-year floodplain is subject to a 1% chance of flooding each year or once every 100 years.

Forage. All browse and nonwoody plants available to livestock or wildlife for grazing or harvested for feed.

Foreground. A term used in visual management to describe the stand of trees immediately adjacent to a high-value scenic area, recreation facility, or forest highway. (See "Background," "Middleground")

Forest Development Transportation Plan. The forest development transportation plan describes the forest development transportation system, and as a minimum, consists of two principal documents: a base map or series of base maps showing the location of each facility and an inventory record defining its characteristics. (FSM 7700)

Forest Land. See "Timber Land Classification."

Forest Program. A forest program is the summary or aggregation of project or activity information that makes up an integrated (multifunctional) course of action for a given level of funding on a National Forest that is consistent with the Forest plan.

Forest Residues. The unused portions of sawtimber and poletimber trees cut or killed by harvesting, or the unmerchantable trees cut or killed in precommercial thinnings.

Forest Types. A classification of forest land based upon the tree species presently forming a plurality of stocking in live trees.

FORPLAN. Acronym for Forest Planning Model. FORPLAN is a linear program that assigns unique sets of management activities to specific areas of the forest to compare the productivity of measurable goods and services towards a specific goal or objective function.

Free-to-Grow. A term used by silviculturists to indicate that trees are free of growth restraints, the most common of which is competing vegetation.

Fuels. Combustible wildland vegetative materials. While usually applied to above-ground living and dead surface vegetation, this definition also includes roots and organic surface material normally associated with the forest's litter and decomposition zone layer. (See also Slash)

Fuelwood. Wood that is round, split, sawn and/or otherwise generally refuse material cut into short lenghts or chipped for burning. (FSH 2409.13)

G

Genetic Gain. The increase in productivity following a change in gene frequency. Reforesting using seedlings grown from seed collected from trees with desirable characteristics such as high growth rate is one method by which genetic gain is obtained.

Goal. A concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms and is timeless in that it has no specific date by which it is to be completed. Goal statements form the principal basis from which objectives are developed. (36 CFR 219.3)

Goods and Services. The various outputs, including on-site uses, produced from forest and rangeland resources. (36 CFR 219.3)

Group Selection Cutting. Removal of tree groups ranging in size from a fraction of an acre up to about 2 acres. Area cut is smaller than the minimum feasible under even-aged management for a single stand.

Guideline. An indication or outline of policy or conduct that is not a mandatory requirement (as opposed to a standard, which is mandatory).

H

Habitat. The place where a plant or animal normally lives.

Habitat Capability. The estimated ability of an area, given existing or predicted habitat conditions, to support a wildlife, fish or plant population. It is measured in terms of potential population numbers.

Hardwood. Broad-leaved and deciduous trees.

Harvest Cutting Method. A combination of interrelated actions whereby forests are tended, harvested, and replaced. The combination of management practices used to manipulate the vegetation results in forests of distinctive form and character. Harvest cutting methods are classified as even-aged and uneven-aged.

Heritability. That portion of the total phenotypic resource due to genetic factors.

Herbaceous. An adjective describing seed-producing plants that do not develop persistent woody tissue, but die down to ground level at the end of the growing season.

Hydrologic. Pertaining to the quantity, quality, and timing of water yield from forested lands.

I

Impact. Effects of management activities on a resource that is deleterious, but not necessarily irreversible or irretrievable.

Indicator Species. Species identified in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish including those that are socially or economically important.

Individual Domestic Watershed. A watershed which provides water for human consumption by an individual, or group of people which does not meet the criteria listed in the definition of a Municipal Watershed.

Industrial Wood. All commercial roundwood products, except fuelwood. (FSH 2409.13)

Integrated Pest Management. A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed. The information considered in selecting appropriate strategies includes the impact of the unregulated pest population on various resources values, alternative regulatory tactics and strategies, and benefit/cost estimates for these alternative strategies. Regulatory strategies are based on sound silvicultural practices and ecology of the pest-host system and consist of a combination of tactics such as timber stand improvement plus selective use of pesticides. A basic principle in the choice of strategy is that it be ecologically compatible or acceptable. (36 CFR 219.3)

Intensive Forest Management. A high investment level of timber management that envisions initial harvest, regeneration with genetically improved stock, control of competing vegetation, fill-in planting, precommercial thinning as needed for stocking control, one or more commercial thinnings, and final harvest.

Interdisciplinary Approach. Using individuals representing two or more areas of knowledge and skills focusing on the same tasks, problem, or subject.

Interdisciplinary Planning Team. That group of Okanogan National Forest employees that used an interdisciplinary approach to analyze the issues and alternatives.

Intermediate Harvest. Any removal of trees from a stand between the time of its formation or establishment and the harvest cut. Generally taken to include cleaning, thinning, liberation and improvement cuttings, increment felling, and sometimes even salvage and sanitation cuttings.

Intermingled Ownerships. Lands within the National Forest boundaries or surrounded by National Forest lands that are owned by private interests or other government agencies. Because of early land grants, these lands frequently are in checkerboard ownership patterns.

Intermittent Stream. Stream that does not normally flow water all year.

Irretrievable. Applies to losses of production, harvest, or use of renewable natural resources. For example, some or all of the timber production from an area is irretrievably lost during the time an area is used as a winter sport site. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

Irreversible. Applies primarily to the use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long time periods. Irreversible also includes loss of future options.

Issue. A point, matter or question of public discussion or interest to be addressed or decided through the planning process.

L

Land Allocation. The assignment of a management emphasis to particular land areas with the purpose of achieving the goals and objectives of that alternative.

Land Class. The topographic relief of a unit of land. Land classes are separated by slope, which coincides with the timber inventory process. The three land classes used in the Forest Plan are defined by the following slope ranges: 0% to 35%; 36% to 55%; greater than 55%.

Leasables. Federally owned minerals which are disposed under the Mineral Leasing Act of 1920, as amended. These include oil and gas, coal, oil shale, geothermal resources, sodium, potassium, phosphate and sulfer in some states. On acquired lands (of which the Okanogan National Forest has none) minerals that are normally locatable are also disposed by leasing.

Lifestyle. The characteristic way people live, indicated by consumption patterns, work, leisure, and other activities.

Limits of Acceptable Change. The amount of human-caused change in the ecological and social factors without loss of wilderness as described in the Wilderness Act [16 U.S.C. 1131 (c)].

Linear Programming. Method used to provide optimal solutions to certain kinds of allocation problems. It is characterized by linear relationships and known constants, and is capable of addressing the problem of simultaneous allocations and scheduling.

Local Roads. These roads connect terminal facilities with forest collector or forest arterial roads, or public highways. The location and standard are usually determined by that required to serve a specific resource activity, rather than travel efficiency. Forest local roads may be developed and operated for either long- or short-term service. (FSM 7700)

Locatables. Most metallic and some non-metalic Federally owned minerals which can be located and patented under the 1892 Mining Law, as amended.

Lodgepole Pine Working Group. Available suitable forest lands that now or in the past have supported stands primarily composed of lodgepole pine, and when fully stocked with natural, unmanaged stands, the land is capable of producing a culmination of mean annual increment of at least 20 cubic feet per acre per year.

Long-Term Sustained Yield Capacity (LTSYC). The highest uniform wood yield from lands being managed for timber production that may be sustained under a specified intensity of management consistent with multiple objectives (FSM 1920).

Low Productive Working Group. Available suitable forest lands that now or in the past have supported stands of lodgepole pine or mixed coniferous species, and where fully stocked with natural, unmanaged stands, the land is not capable of producing a culmination of mean annual increment of at least 20 cubic feet per acre per year. See also "Separate Suitability Component".

LPSIM. A computer simulation model used to project the development of lodgepole pine stands managed to meet various objectives. LPSIM was used to develop FORPLAN coefficients for timber, range and wildlife resources. (See PROGNOSIS for mixed conifer stands.)

M

M. Thousand. Example: MBF is thousand board feet.

Maintenance Level. A formally established criterion which prescribes the intensity of maintenance necessary for the planned operation of a road. (FSH 7709.15)

Maintenance Level 1. This level is assigned to intermittent service roads during the time management direction requires that the road be closed or otherwise blocked to traffic. Basic custodial maintenance is performed to protect the road investment and to keep damage to adjacent resources to an acceptable level. Drainage facilities and runoff patterns are maintained. (FSH 7709.15)

Maintenance Level 2. This level is assigned where management direction requires that the road be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permittted, dispersed recreation, or other specialized uses. Log haul may occur at this level.

Roads in this maintenance level are normally characterized as single lane, primitive type facilities intended for use by high clearance vehicles. Passenger car traffic is not a consideration. (FSH 7709.15)

Maintenance Level 3. This level is assigned where management direction requires the road to be open and maintained for safe travel by a prudent driver in a passenger car. Traffic volumes are minor to moderate; however, user comfort and convenience is not considered a priority.

Roads at this maintenance level are normally characterized as low speed, single lane with turnouts and spot surfacing. Some road may be fully surfaced with either native or processed material. The functional classification of these roads is normally local or minor collector. (FSH 7709.15)

Maintenance Level 4. This level is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes are normally sufficient to require a double lane aggregate surfaced road. Some roads may be single lane and some may be paved and/or dust abated. The functional classification of these roads is normally collector or minor arterial. (FSH 7709.15)

Maintenance Level 5. This level is assigned where management direction requires the road to provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated. Functional classification of these roads is normally arterial. (FSH 7709.15)

Management Area. An area with similar management objectives and a common management prescription.

Management Concern. An issue, problem, or a condition which constrains the range of management practices identified by the Forest Service in the planning process. (36 CFR 219.3)

Management Direction. A statement of multiple-use and other goals and objectives, the associated management prescriptions, and standards and guidelines for attaining them. (36 CFR 219.3)

Management Intensity. The management practices or combination of management practices and associated costs designed to obtain different levels of goods and services. (36 CFR 219.3)

Management Prescriptions. A set of management practices and intensity selected and scheduled for application on a specific area to attain desired objectives (36 CFR 219.3).

Maximum Modification. See "Visual Quality Objectives."

MBF. One thousand board feet. Lumber or timber measurement term.

MCF. One thousand cubic feet. Volume measurement term that is used to determine total commercial wood fiber.

Mean Annual Increment. The total increment of trees in a stand up to a given age divided by that age, usually expressed in annual cubic feet of growth per acre (cubic meters of growth per hectare).

Middleground. The visible terrain beyond the foreground where individual trees are still visible, but do not stand out distinctly from the stand. (See "Foreground" and "Background")

Minimum Management Requirements. Management practices, or activities that are designed to prevent unacceptable damage to the forest resources when timber management activities are implemented. They include: minimum sizes, location, and distribution of certain vegetation communities necessary for viable wildlife populations; protection of vegetation and soils from timber harvest activities on slopes prone to landsliding, and along perennial streams where the vegetation is necessary for healthy watershed conditions; and scheduling of harvest to control the amount harvested in each landtype association in any 10 year period.

Mitigation. Actions to avoid, minimize, reduce, eliminate, or rectify the impact of a management practice.

Mixed Conifer Type. Forest stands containing two or more of the following species: ponderosa pine, Douglas-fir, western larch, Engelmann spruce, subalpine fir, western red cedar. Lodgepole pine may be found in some stands. The majority of stands on the Okanogan National Forest are mixed conifers. Mixed conifer stands include both the wet productive and dry productive working groups.

MM. Million. Example: MMBF is abbreviation for millions of board feet.

Modification. See "Visual Quality Objectives."

Moist Productive Working Group. See "Wet Productive Working Group".

Monitor. To observe, measure, and evaluate changes in environmental quality and/or its effects.

Municipal Watershed. A watershed which provides water for human consumption, where Forest Service management could have a significant effect on the quality of water at the intake point, and that provides water utilized by a community or any other water system that regularly serves: 1) at least 25 people on at least 60 days in a year, or 2) at least 15 service connections. In addition to towns, this includes campgrounds and residential developments.

N

Natural Forest. The condition of a forest environment at any point in time, including its associated plant and animal communities, which has been reached essentially through the process of natural succession. This process would include the effects of natural catastrophic occurrences.

Natural Fuels. Fuels not directly generated or altered by resource management activity. This includes fuels that have accumulated as a result of fire exclusion.

Net Public Benefits. An expression used to signify the overall long-term value to the nation of all outputs and positive effects (benefits) less all associated inputs and negative effects (costs) whether they can be quantitatively valued or not. Net public benefits are measured by both quantitative and qualitative criteria rather than a single measure or index. The maximization of net public benefits to be derived from management of units of the National Forest System is consistent with the principles of multiple-use and sustained yield. (36 CFR 219.3)

Net Value Change (NVC). (Also Net Resource Value Change). The sum of the changes in resource values on a land area that results from increases (benefits) and decreases (damages) in resource outputs as a consequence of a wildfire. [See Also Cost Plus Net Value Change (C+NVC)]

Nonchargeable Volume. All volume not included in the growth and yield projections for selected management prescriptions used to arrive at the allowable sale quantity.

Nonconsumptive Use. That use of a resource that does not reduce its supply; for example, nonconsumptive uses of water include hydroelectric power generation, boating, swimming, and fishing.

Nondeclining Flow. See "Base Sale Schedule."

Nongame. Species of animals not managed for sport hunting.

Nonmarket. Products derived from National Forest resources that do not have a well-established market value, for example, recreation, wilderness, wildlife.

Non-Point Source Pollutant. An area source of water or air pollution in contrast to a point source such as an outlet or smokestack from a factory.

Non-Priced Outputs. Outputs for which there is no available market transaction evidence and no reasonable basis for estimating a dollar value commensurate with the market values associated with priced outputs.

Noxious Weeds. A plant species that is undesirable because it conflicts, restricts, or otherwise causes problems under the management objectives.

O

Objective. A concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and the resources to be used in achieving identified goals. (36 CFR 219.3)

Objective Function. This is the criterion of optimality used to solve an LP and usually is expressed as "maximize present new value for 150 years," or "maximize timber volume," but could be "minimize cost," etc. Refer to FORPLAN User's Guide (Johnson et al., 1980) for a listing of available objective functions.

Off Road Vehicle (ORV). Two, three or four wheeled motorized vehicles capable of traversing slopes that are often steep and sandy, muddy or snowy. These vehicles are used by some people for a form of recreation that is valued for the thrills of speed, loud noise, and the apparent power over natural barriers that can be derived from their use.

Old Growth. A forest comprised of many large trees, large snags and numerous large down logs; having a multi-layered canopy composed of several tree species; the trees showing signs of decadence; the last stage in forest succession.

Old Growth Habitat. Old growth (defined above) conifer stands of the type, condition and size that provide for old growth wildlife indicator species (spotted owl and barred owl), as well as mature wildlife indicators (marten, pileated woodpecker and three-toed woodpecker).

Operational Costs. Those costs required to operate programs, administer the activities involved, and maintain capital improvement.

Opportunity. A proposal that is considered in developing alternatives, projects or programs where an option exists to invest profitably to improve or maintain a present condition.

Opportunity Costs. The value of a resource's forgone net benefit in its most economically efficient alternative use.

Output. The goods, end products or services that are purchased, consumed or used directly by people. Goods, services, products and concerns produced by activities that are measurable and capable of being used to determine the effectiveness of programs and activities in meeting objectives. A broad term for describing any result, product or service that a process or activity actually produces.

Overstory. The trees in a forest of more than one story that form the upper or uppermost canopy layer.

P

PAMARS. Program Accounting and Management Attainment Reporting Systems. Forest Service central cost accounting system.

Partial Cutting. Tree removal other than a clearcutting, i.e. taking only part of the stand.

Partial Retention. See "Visual Quality Objectives."

Perennial Stream. Stream that runs water year long during most years.

Pests. Any animal or plant that, during some portion of its life cycle, inhibits the establishment or growth of some other species of plant or animal favored by man.

Precommercial Thinning. A thinning made in an immature stand primarily to maintain or accelerate diameter increment. Trees removed (cut or killed) in thinning are not saleable.

Prescribed Fire. A wildland fire burning under preplanned, specified conditions to accomplish specific planned objectives.

Present Net Value. Is the difference between the discounted value (benefits) of all outputs to which monetary values or established prices are assigned and the total discounted costs of managing the planning area.

Preservation. See "Visual Quality Objectives."

Prevention of Significant Deterioration. A special permit procedure established in the Clear Air Act, as amended, used to ensure that economic growth occurs in a manner consistent with; protection of public health; preservation of air quality and air quality related values in national special interest areas; the opportunity for informed public participation in the decision-making process.

Price-Quantity Relationship. A schedule of prices that would prevail in a market for various quantities of the output exchanged. (See Demand Schedule and Supply Schedule)

Priced Outputs (Benefits). Those that are or can be exchanged in the market place.

Primitive. See "Recreation Opportunity Spectrum."

Professional Judgment. Statement of conditions, or interrelationships involving natural features or phenomenon proposed as a likely theory, based on experience rather than rigorous research, by a person trained in the science and current state of the art of the particular field for which the theory applies (e.g. habitat requirements of species not studied in detail, as stated by a wildlife biologist).

PROGNOSIS. A computer simulation model used to project the development of mixed conifer forest stands managed to meet various objectives. PROGNOSIS was used to develop FORPLAN coefficients for timber, range and wildlife resources. (See LPSIM for lodgepole pine stands.)

Program. Sets of activities or projects with specific objectives, defined in terms of specific results are responsibilities for accomplishments.

Program Budget. A plan that allocates annual funds, work force ceilings and targets among agency management units.

Program Budget Level. A single, comprehensive integrated program responsive to the Chief's direction that specifies a level of production attainable from a given investment of dollars and other resources. Each budget level represents a complete, full and independent package within the criteria and constraints identified.

Program Element. An individual Forest Service area of responsibility, which in combination with other elements, comprises the statutory or Executive directed mission of the Forest Service. Specific Forest Service program elements are defined in the Management Information Handbook (FSH 1309.11a).

Program Proposals. A multiyear course of action proposed under a given set of assumptions and constraints.

Prohibit. A road management strategy where some user groups or all users are informed not to use this road and this is actively enforced under a regulatory order. (FSH 7709.21)

Project. An organized effort to achieve an objective identified by location, activities, outputs, effects, and time period and responsibilities for execution.

Public Involvement. A Forest Service process designed to broaden the information base upon which agency decisions are made by (1) informing the public about Forest Service activities, plans, and decisions, and (2) encouraging public understanding about and participation in the planning processes which lead to final decision-making.

Public Issue. A subject or question of widespread public interest relating to Management of the National Forest System. (36 CFR 219.3)

Public Participation Activities. Meetings, conferences, seminars, workshops, tours, written comments, survey questionnaires, and similar activities designed or held to obtain comments form the general public and specific publics.

R

Rainfall Factor. A value used in the Universal Soil Loss Equation. It is a summation of total raindrop energy. It is specifically proportional to the maximum 30-minute storm intensity for a year.

Rangeland. Land on which the climax vegetation (potential natural plant community) is predominatnly grasses, grasslike plants, forbs, or shrubs suitable for grazing and browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundra, and certain forb and shrub communities. It also includes areas seeded to native or adapted introduced species that are managed like native vegetation.

Real Dollar Value. A monetary value which compensates for the effects of inflation. (36 CFR 219.3)

Receipt Shares. The portion of receipts derived from Forest Service resource management that is distributed to State and county governments such as the Forest Service 25 percent fund payments. (36 CFR 219.3)

Recreation Capacity. The number of people that can take advantage of the supply of a recreation opportunity during an established use period without substantially diminishing the quality of the recreation experience or the biophysical resources.

Recreation Information System (RIM). An electronic system for storing recreation information.

Recreation Opportunity Spectrum (ROS). Land delineations that identify a variety of recreation experience opportunities categorized into six classes on a continuum from primitive to urban. Each class is defined in terms of the degree to which it satisfies certain recreation experience needs, based on the extent to which the natural environment has been modified, the type of facilities provided, the degree of outdoor skills needed to enjoy the area, and the relative density of recreation use. The six classes are primitive, roaded natural, rural, semi-primitive motorized, semi-primitive non-motorized and urban:

> **Primitive.** Area is characterized by an essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.
>
> **Roaded Natural.** Area is characterized by predominantly natural-appearing environments with moderate evidence of the sights and sounds

of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high, with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is allowed and incorporated into construction standards and design of facilities.

Rural. Area is characterized by a natural environment that has been substantially modified by development of structures, vegetative manipulation, or pastoral agricultural development. Resource modification and utilization practices may be used to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, andthe interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate user densities are present away from developed sites. Facilities for intensified motorized use and parking are available.

Semi-primitive Nonmotorized. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but would be subtle. Motorized recreation use is not permitted, but local roads used for other resource management activities may be present on a limited basis. Use of such roads is restricted to minimize impacts on recreational experience opportunities.

Semi-primitive Motorized. Area is characterized by a predominantly natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions use of local primitive or collector roads with predominantly natural surfaces and trails suitable for motor bikes is permitted.

Urban. Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are often used to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans are predominant on site. Large numbers of users can be expected both on site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transmit often available to carry people throughout the site.

Recreation Visitor Days (RVD's). Twelve visitor hours, which may be aggregated continuously, intermittently, or simultaneously by one or more persons.

Regeneration. The renewal of a tree crop whether by natural or artificial means. Also the young crop itself which is commonly referred to as reproduction (seedlings, saplings and immature pole-sized trees existing in a stand).

Regeneration Harvest. Any removal of trees intended to assist regeneration already present or to make regeneration possible.

Region. An area covered by a Regional guide. (Region 6 includes Oregon and Washington.) See FSM 1221.3 for organizational definitions.

Regulations. Generally refers to the Code of Federal Regulations, Title 36, Chapter II, which covers management of the Forest Service.

Renewable Resources. Resources that are possible to use indefinitely, when the use rate does not exceed the ability to renew the supply.

Renewable Resources Assessment. An appraisal of the Nation's renewable resources that recognizes their vital importance and the necessity for long-term planning and associated program development. The Assessment meets the requirements of Section 3 of the Resources Planning Act and includes analyses of present and anticipated uses, demands, and supplies of the renewable resources; a description of Forest Service programs and responsibilities; and a discussion of policy considerations, laws, and regulations.

Residual Stand. The trees remaining standing after some event such as selection cutting.

Resource Element. A major endeavor which fulfills statutory or Executive requirements and indicates a colleciton of activities from the various operating programs required to accomplish the Forest Service mission. There are seven resource elements:

1. **Recreation.** The resources which provide outdoor recreational opportunities for the Nation. Included are development of new knowledge, and technical assistance.

2. **Wilderness.** The Nation's wilderness resource. This element includes lands designated for preservation and protection in their natural condition for the National Wilderness Preservation System.

3. **Wildlife and fish.** The resources which are directed toward protection and improvements of wildlife and fish populations and habitats. Coordination with State agencies is a key element. Included are technical assistance and development of new knowledge.

4. **Range.** The resources needed to manage, protect, and develop forest and range lands for grazing. The element encompasses activities on both National Forest and private forest and range lands, and the research needed to effectively consider management alternatives.

5. **Timber.** The resources needed to grow wood and to make it available to the Nation on a continuing basis. This element includes activities needed to protect, manage, harvest, and utilize wood and wood-related products.

6. **Water.** The administration and enhancement of water resources in a manner consistent with other resource values. This element includes watershed and river basin planning and development in cooperation with States and other agencies, and research designed to gain further knowledge.

7. **Minerals.** The administration of exploration and development of minerals in a manner consistent with other resource values on National Forest lands. This element also includes research and cooperative activities to enhance reclamation of mined lands.

Responsible Line Officer. For land management planning purposes, the Forest Service employee who has been delegated the authority to carry out a specific planning action. (36 CFR 219.3)

Retention. See "Visual Quality Objectives."

Riparian Zone, Habitat or Area. Terrestrial areas where the vegetation and microclimate are influenced by perennial and/or intermittent water, associated high water tables and soils which exhibit some wetness characteristics; this habitat is transitional between true bottom land wetlands and upland terrestrial habitats and, while associated with water courses, may extend inland for condiserable distances.

Road Management Strategy. The road management strategy is indicated by action verbs used in a road management objective. A noun is needed to show what group of users or type of vehicle is affected. Action verbs are encourage, accept, discourage, eliminate and prohibit. They are defined in this glossary.

Roaded Natural. See "Recreation Opportunity Spectrum."

Roadless Area. Portion of the National Forest that is essentially unroaded. Activities, such as timber harvest and recreation, and management of the recreation, wildlife, watershed and range resources may occur providing they do not require the construction of a road, or use of an existing road that has been obliterated as part of the roadless management designation.

Rotation. The number of years required to establish (including the regeneration period) and grow timber crops to a specified condition or maturity for regeneration harvest. Selected management prescriptions in the forest provide the basis for the rotation age. (FSH 2409.13)

Rural. See "Recreation Opportunity Spectrum."

S

Salables. Common varieties of sand, gravel, stone and some other widely available mineral materials which are acquired from Federal lands by sale under the Materials Sale Act of 1947, as amended.

Sale Schedule. The quantity of timber planned for sale by time period, from the area of suitable land covered by a Forest plan. The first period, usually a decade, of the selected sale schedule provides the allowable sale quantity. Future periods are shown to establish that long-term sustained yield will be achieved and maintained. (36 CFR 219.3)

Salvage Cutting. The exploitation of trees that are dead, dying or deteriorating (e.g. because they are overmature or have been materially damaged by fire, wind, insects, fungi or other injurious agencies) before their timber becomes worthless.

Sanitation Cutting. The removal of dead, damaged or susceptible trees done primarily to prevent the spread of pests or pathogens and so promote forest hygiene.

Sawtimber. Trees containing at least one 12-foot sawlog or two noncontiguous 8-foot logs, and meeting regional specifications for freedom from defect. During the coming decade, minimum diameter at breast height for all species except lodgepole pine is 9 inches. Minimum diameter for lodgepole pine is 7 inches. During future decades, minimum diameter for all species is assumed to be 7 inches.

Scoping. The act of formulating the range of actions, alternatives and impacts considered in an environmental impact statement.

SCORP (State Comprehensive Outdoor Recreation Plan). A plan designed to show the relationship of physical resources and developed facilities to opportunities for participation now and in the future.

Sea-run. See "Anadromous."

Second Growth. Forest growth that has come up naturally after some perturbance (for example, cutting, serious fire, or insect attack) with the previous forest growth.

Sediment. Boulders, gravels, and sand or smaller sized mineral materials (often with inclusions of organic debris) from an upslope area, either moving through a stream system or deposited on a streambed, lake or wetland.

Seed Orchard. A plantation established primarily for the production of seed of proven genetic quality.

Seed Tree Cutting. The cutting method that describes the silvicultural system in which the dominant feature is the removal of all trees in one cut except for a small number of seed bearers left singly or in small groups, usually 8 to 10 per acre (20 to 25 per hectare). The seed trees generally are harvested when regeneration is established. An even-aged stand results.

Semi-Primitive Motorized ROS Class. See "Recreation Opportunity Spectrum."

Semi-Primitive Non-Motorized ROS Class. See "Recreation Opportunity Spectrum."

Sensitive Species. Those species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official State list, or that are recognized by the Regional Forester as needing special management to prevent their being placed on Federal or State lists.

Sensitivity Analysis. A determination of the consequences of varying the level of one or several factors while holding other factors constant.

Separate Suitability Component (SSC). Suitable forest lands available for timber production that are not capable of producing at least 20 cubic feet per acre per year at culmination of the mean annual increment (CMAI) and for which the quality of knowledge and information regarding response to timber management is less than on more productive lands. Harvest schedules for these lands are calculated separately and non-interchangeably from harvest schedules for more productive lands.

Seral. A biotic community that is a developmental, transitory stage in an ecological succession.

Serotinous. A term applied to plant species or individuals that flower or fruit late in the season and to fruit or cones that remain on the tree without opening for one or more years (as the serotinous cones of jack pine, lodgepole pine and the Ocala variety of sand pine).

Shade-Intolerant Plants. Plant species that do not germinate or grow well in shade.

Shade-Tolerant Plants. Plants that grow well in shade.

Shelterwood Cutting. The cutting method that describes the silvicultural system in which, in order to provide a source of seed and/or protection for regeneration, the old crop (the shelterwood) is removed in two or more successive shelterwood cuttings. The first cutting is ordinarily the seed cutting, though it may be preceded by a preparatory cutting, and the last is the final cutting. Any intervening cutting is termed removal cutting. An even-aged stand results.

Silviculture. The art and science of controlling the establishment, composition and growth of forests.

Silvicultural System. A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the fellings that remove the mature crop and provide for regeneration and according to the type of forest thereby produced. (36 CFR 219.3)

Single Tree Selection. The cutting method that describes the silvicultural system in which trees are removed individually, here and there, each year over an entire forest or stand. The resultant stand usually regenerates naturally and becomes all-aged.

Site Preparation. Manipulation of the vegetation or soil of an area prior to planting or seeding. The manipulation follows harvest, wildfire, or construction in order to encourage the growth of favored species. Site preparation may include the application of herbicides; prescribed burning, or cutting of living vegetation that competes with the favored species; tilling the soil; or burning of organic debris (usually logging slash) that makes planting or seeding difficult.

Slash. The residue left on the ground after timber cutting and/or accumulating there as a result of storm, fire or other damage. It includes unused logs, uprooted stumps, broken or uprooted stems, branches, twigs, leaves, bark and chips.

Small Game. Birds and small mammals typically hunted or trapped.

Snag. A standing dead tree.

Snow Intercept Thermal Cover. Vegetation that reduces energy expense due to movement and temperature regulation by deer, and provides forage during periods of deep snow (18 inches or greater).

Socio-economic. Pertaining to, or signifying the combination or interaction of, social and economic factors.

Softwoods. Coniferous trees, usually evergreen, having needles or scale-like leaves.

Soil Erodibility Factor. A factor used in the Universal Soil Loss Equation. The soil erodibility factor provides a relative indices of a soil's resistance to surface erosion. Soil erodibility factors are not established for individual soils on the forest. The soil characteristics which most influence erodibility; soil structure, texture, permeability and organic matter are known. A factor of 0.24 is assumed for soils on the forest.

Stand. A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement or condition to be distinguishable from adjacent communities and so form a silvicultural or management entity. (FSH 2409.13)

Stand Density. A measure of the degree of crowding of trees within stocked areas, commonly expressed by various growing-space ratios such as crown length to tree height, crown diameter at breast height (4.5 feet or 1.37 meters above the ground), or crown diameter to tree height, or of stem (triangular) spacing to tree height.

Stream Class. A classification of streams used in Region Six of the Forest Service which is based upon the current and forseeable uses of the water from that stream and the stream's potential for affecting downstream uses. The stream classes defined are Class I, Class II and Class III.

Class I. A perennial or intermittent stream or segment that is a direct source of water for municipal use, used by large numbers of fish for spawning rearing or migration or flows enough water to be a major contributor to the quality of water in another Class I stream.

Class II. A perennial or intermittent stream or segment that is used by moderate, though significant, numbers of fish for spawing, rearing or migration and/or flows enough water to be a moderate or not clearly identifiable contributor to the quanitity of water in Class I or be a major contributor to a Class II stream.

Class III. All other perennial streams or segments not meeting Class I or II criteria.

Class IV. All other intermittent streams or segments not meeting Class I or II criteria.

Streamside Management Units. The stream and adjacent area of varying width where construction and harvesting or other management activities have the potential toaffect water quality, fish or other aquatic resources. The SMUs are classified by stream Classes (defined above).

Stocking. The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standared such as the basal area and/or number of trees required for full utilization of the land's growth potential. (FSH 2409.13)

Stream Structure. The arrangement of logs, boulders and meanders which modify the flow of water. It causes the formation of pools and gravel bars. Generally, there is a direct relationship between complexity of structure and fish habitat. Complex structure is also an indication of watershed condition.

Succession. The progressive development of vegetation toward its highest ecological expression, the climax community; replacement of one plant community by another.

Successional Stage. A stage or recognizable conditions of a plant community that occurs during its development from bare ground to climax; for example, coniferous forests in the Blue Mountains progress through six recognized stages: grass-forb; shrub-seedling; pole-sapling; young; mature; old growth.

Suitability. The appropriateness of applying certain resource management practices to a particular area of land, as determined be an analysis of the economic and environmental consequences and the alternative uses foregone. A unit of land may be suitable for a variety of individual or combined management practices.

Suitable Forest Land. See "Timber Land Classification."

Superior Tree. A tree selected from the forest because of desirable growth, form or disease resistance characteristics for use in a genetic tree improvement program.

Supply. The amount of an output that producers are willing to provide at the specified price, time period, and condition of sale.

Supply Schedule (Curve). A schedule of amounts of an output that producers are willing to provide at a range of prices, at a given point in time and condition of sale. (See Price-Quantity Relationship)

Suppression. The action of controlling, containing or confining a wildfire. (See Also Appropriate Suppression Response)

Sustained-Yield of Products and Services. The achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forest System without impairment of the productivity of the land. (36 CFR 219.3)

T

Thermal Cover. Cover used by animals to lesson the effects of weather; for elk, a stand of coniferous trees 40 feet or more tall with an average crown closure of 70 percent or more.

Threatened Species. Those plants or animal species likely to become endangered species throughout all or a significant portion of their range within the foreseeable future.

Timber Land Classification. Forested land is classified under each of the land management alternatives according to how it relates to the management of the timber resource. The following are used for this purpose: commercial forest land, forest, non-forest, suitable, unsuitable.

> **Commercial Forest Land** - Forest land that is producing or is capable of producing crops of industrial wood and (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soil productivity or watershed conditions; and (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that adequate restocking can be attained within five years after final harvesting. (FSH 2409.13)
>
> **Forest Land** - Land at least ten percent occupied by forest trees or formerly having had such tree cover and not currently developed for non-forest use. (FSH 2409.13)
>
> **Non-forest Land** - Lands that never have had or that are incapable of having ten percent or more of the area occupied by forest trees; or lands having such cover and currently developed for non-forest use. (FSH 2409.13)
>
> **Suitable Forest Land** - Land to be managed for timber production on a regulated basis. (FSH 2409.13)
>
> **Unsuitable Forest Land (Unsuited or Not Suited)** - Forest land not managed for timber production because: (a) Congress, the Secretary of Agriculture or the Chief of the Forest Service has withdrawn it; (b) it is not producing or capable of producing crops of industrial wood; (c) technology is not available to prevent irreversible damage to soil productivity or watershed conditions; (d) there is no reasonable assurance based on existing technology and knowledge that it is possible to restock lands within five years of final harvest, as reflected in current research and experience; (e) there is, at present, a lack of adequate information about responses to timber management activities; or (f) timber management in inconsistent with or not cost efficient in meeting the management requirements and multiple-use objectives specified in the Forest Plan. (FSH 2409.13)

Timber Harvest Schedule. The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan. The first period, usually a decade, of the selected harvest schedule provides the allowable sale quantity. Future periods are shown to establish that sustained yield will be achieved and maintained.

Timber Production. The purposeful growing, tending, harvesting and regeneration of regulated crops of trees to be cut into logs, bolts or other round sections for industrial or consumer use. For planning purposes, the term "timber production" does not include production of fuelwood. (26 CFR 219.3)

Timber Sale Program Quantity. The volume of timber planned for sale during the first decade of the planning horizon. It includes the allowable sale quantity (chargeable volume) and any additional material (non-chargeable volume) planned for sale. The timber sale program quantity is usually expressed as an annual average for the first decade.

Timber Stand Improvement. Measures such as thinning, pruning, release cutting, prescribed fire, girdling, weeding or poisoning of unwanted trees aimed at improving growing conditions for the remaining trees.

Total Resource Inventory - An information management system for the Okanogan National Forest that consists of maps, orthophotos and computer data records. The type of information concerns renewable resources.

Total Suspended Particulates (TSP). The total amount of particulate matter suspended in the atmosphere as measured by the standard reference method (re. a hi-volume sampler).

Tradeoff. The reduction or limitation of one or more benefits, or amounts of those benefits in favor of increasing, or improving some other benefits. Some amount of tradeoff is necessary when benefits are not totally compatable, and compete for the same basic resource (e.g., timber harvest and fish habitat both may compete for the condition of the natural vegetation cover).

Tree Improvement Program. An organized effort by the National Forest and cooperating individuals, corporations and agencies designed to identify, select and culture trees found in the forest that exhibit desirable phenotypic characteristics for the purpose of improving productivity and disease resistance in future stands.

U

Unacceptable Modification. A visual quality level that is unacceptably low by Forest Service standards.

Understory. Trees and woody species growing under an overstory.

Uneven-aged Management. The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Cutting is usually regulated by specifying the number or proportion of trees of particular sizes to retain within each area, thereby maintaining a planned distribution of size classes. Cutting methods that develop and maintain uneven-aged stands are single-tree selection and group selection. (36 CFR 219.3)

Universal Soil Loss Equation. A mathamatical model developed to estimate the long-term average soil surface erosion on agricultural lands. It has been modified for use on forested lands to predict sheet and rill erosion resulting from vegetative manipulation and road construction activities.

Unproductive Forest Land. Forest land which produces less than 20 cubic feet per acre per year.

Unsuitable Forest Land (Not Suited or Unsuited). See "Timber Land Classification."

Urban. See "Recreation Opportunity Spectrum."

Utility and Transportation Corridors. A strip of land designated for the transportation of energy, commodities, and communications by railroad, state highway, electrical power transmission (69 KV and above), oil and gas and coal slurry pipelines 10 inches in diameter and larger, and telecommunication cable and electronic sites for interstate use. Transportation of minor amounts of power for short distances, such as short feeder lines from small power projects including geothermal or wind, or to serve customer subservice substations along the line, are not be treated within the Forest Plan effort.

Utilization Standards. Standards guiding the use and removal of timber, which is measured in terms of diameter at breast height (d.b.h.), top diameter inside the bark (top d.i.b.), and percent "soundness" of the wood.

V

Vegetation Leave Area. Area of land in which vegetation is left undisturbed in order to provide shade and organic debris to streams, or to prevent the acceleration of natural erosion processes. No regulated timber harvest is planned in these areas.

Viable Population. A population which has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population on the planning area.

Viewshed. Portion of the forest that is seen from a major travel route, or high use location.

Visibility. The ability to clearly see distant features and unimpaired colors and textures of intermediate distance scenic elements.

Visual Quality Objectives (VQO's). Categories of acceptable landscape alteration measured in degrees of deviation from the natural-appearing landscape. These categories are maximum modification, modification, partial retention, preservation, retention.

> **Maximum modification.** Visual quality objective where human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.
>
> **Modification.** Visual quality objective where human activity may dominate the characteristic landscape, but must at the same time, follow naturally established form, line, color and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
>
> **Partial Retention.** Visual quality objective where human activity may be evident, but must remain subordinate to the characteristic landscape.
>
> **Preservation.** Visual quality objective where essentially all changes result from natural processes.
>
> **Retention.** Visual quality objective where human activities are not evident to the casual forest visitor.

Visual Resource. The composite of basic terrain, geologic features, water features, vegetative patterns and land-use effects that typify a land unit and influence the visual appeal the unit may have for visitors.

W

Watershed. Portion of land where all surface water drains to a common point. Watersheds can range from a acres to many thousands of acres for a stream that drains hundreds of connected intermittent and perennial streams.

Wet Productive Working Group. Available suitable forest lands that support or have supported stands of Douglas-fir, Engelmann spruce and associated species. Lodgepole pine may occur on some sites. When fully stocked with natural, unmanaged stands, sites must be capable of producing a culmination of mean annual increment of at least 20 cubic feet per acre per year.

Wetlands. Areas that are inundated by surface water or groundwater with a frequency sufficient to support, and under normal circumstances does or would support, a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction (Executive Order 11990).

Wilderness. Areas designated by congressional action under the 1964 Wilderness Act. Wilderness is defined as undeveloped Federal land retaining its primeval character and influence without permanent improvements or human habitation. Wilderness areas are protected and managed to preserve their natural conditions, which generally appear to have been affected primarily by the forces of nature, with the imprint of human activity substantially unnoticeable; have outstanding opportunities for solitude or for a primitive and confined type of recreation; include at least 5,000 acres or are of sufficient size to make practical their preservation, enjoyment, and use in an unimpaired condition; and may contain features of scientific, educational, scenic, or historical value as well as ecologic and geologic interest.

Wild and Scenic Rivers. Those rivers or sections of rivers designated as such by congressional action under the 1968 Wild and Scenic Rivers Act, as supplemented and ammended, or those sections of rivers designated as wild, scenic, or recreational by an act of the Legislature of the State or States through which they flow. Wild and scenic rivers may be classified and administered under one or more of the following categories:

1. **Wild River Areas.** Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.

2. **Scenic River Areas.** Those rivers or sections of rivers that are free of impoundments, with watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.

3. **Recreation River Areas.** Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wildfire. Any wildland fire that is not designated and managed as a prescribed fire within an approved prescription.

Wildlife and Fish User Day (WFUD). Twelve visitor hours which may be aggregated continuously, intermittently or simultaneously by one or more persons.

Windfall (Windthrow). A tree or trees blown down or uprooted by the wind, or the stem or other parts (such as branches, foliage or fruit) broken off or blown down by the wind.

Withdrawal. A specified area withdrawn from the action of mining, mineral leasing and/or other land laws by an Executive Order or by statute.

Woody Material. Organic materials necessary for stream channel stability and maintenance of watershed condition. It includes large logs and root wads.

Y

Yarding. The moving of logs from the stump where cut to a central concentration area or landing.

Yield. The amount of forest produce that may be harvested periodically from a specified area over a stated period in accordance with the objectives of management.

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